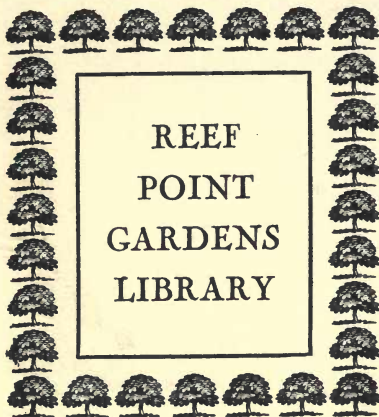


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JOTTINGS OF A GENTLEMAN
GARDENER

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Jottings of a Gentleman Gardener

A PRACTICAL GUIDE TO FLOWER
GARDENING FOR AMATEUR GARDENERS

TO WHICH IS ADDED
SOME SUGGESTIONS ON GROWING FOOD
PLANTS DURING THE WAR

Ernest
BY
E. T. ELLIS, F.R.H.S.
" "

"A Garden is a place for flowers, a place where one may foster a passion for loveliness, may learn the magic of colour, and the glory of form, and quicken sympathy with Nature in her higher moods."

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DEDICATION

TO ALL AMATEUR GARDENERS
AND MY MANY FRIENDS
I DEDICATE THIS BOOK.

E. T. ELLIS.

PREFACE

SINCE this book was completed in October, 1916, the question of food production has become one of national importance, and it did not seem right to publish it without some reference to the culture of vegetables. The last two chapters have therefore been added to meet the special circumstances of the time. Although thirty deal with flower growing, and only two with vegetables, it must be remembered that much of the work described under soils and manures holds good alike for flowers and vegetables.

Even in War-time, when food is so important, I am convinced that we can hardly do without flowers, for they can do so much to brighten up the hours, days, and weeks which might otherwise to many of us be full of gloom, and, maybe, sorrow. Who will deny that flowers cheer us and help us through our difficulties? So it really needs little apology for bringing out the work at the present time. It may be criticised in some of its details, and I hope critics will not "spare my feelings," if they feel it their duty to pull it to pieces. I am, happily, used to criticism; some years of writing for the Press enable me to enjoy it. Any practical suggestions for making the book more generally useful to amateurs will be most welcome, and my Publishers have kindly undertaken to forward letters to me.

I cannot let this book appear without a few words of thanks. I have specially to thank my brother, Mr. Edward Ellis, for the interest he has taken in it; Mr. Lucas for his assistance and advice on several details; and my Publishers for their valuable suggestions during its progress through the Press.

March, 1917.

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Jottings of a Gentleman Gardener.

CHAPTER I.

INTRODUCTORY.

Few words of introduction are needed in a book such as this, devoted as it is entirely to the interests of amateur and hobby gardeners. It is the outcome of much experience and thought, but had it not been for the persuasion of the writer's many friends, he would not have undertaken it.

The writer has had the privilege of contributing to many of the gardening papers, but his friends desired him to try some rather larger work in garden literature. He has complied, and this book of "Jottings" will, he hopes, prove interesting to his friends, and helpful to amateur gardeners. He is fully aware of its incompleteness, and of its imperfections, but he trusts that his readers will judge kindly of his effort, bearing in mind that it makes no profession to completeness.

Perhaps some reason should be given for deferring the chapters on Soils and Manures till near the end of the book. The writer thought it would be better to get to the work of cultivating flowers at once, leaving the more technical information to be perused and digested at leisure.

This little book does not treat of fruits and vegetables, for, although these are to be found in the gardens of many amateurs; yet "A Garden is a place for flowers, a place where one may foster a passion for loveliness, may learn

the magic of colour and the glory of form, and may quicken sympathy with Nature in her brighter moods."

With these few words of introduction the Author invites the attention of his friends and readers to the following pages in the hope that they may prove helpful to many, and may perhaps assist some to a fuller appreciation of the many joys and pleasures and rewards which come to those who devote themselves to the cultivation of the most beautiful things round and about their own home.

CHAPTER I

INTRODUCTION

For whilst the purpose of the book is to give a general idea of the various kinds of plants and animals which are found in the various parts of the world, it is also to give a general idea of the various kinds of plants and animals which are found in the various parts of the world.

The writer has had the advantage of consulting the various kinds of plants and animals which are found in the various parts of the world, and has been able to give a general idea of the various kinds of plants and animals which are found in the various parts of the world.

Perhaps some readers will think that the book is too general, and that it does not give enough details of the various kinds of plants and animals which are found in the various parts of the world. But the writer thinks that it is better to give a general idea of the various kinds of plants and animals which are found in the various parts of the world, than to give too much detail.

CHAPTER II.

STARTING A GARDEN.

I WILL suppose my reader has taken over a piece of land which he wishes to make into a garden. It is at present a rough field covered with grass, and there are plenty of wild plants and weeds growing in it.

How is he going to begin work on this unpromising piece of ground? It looks hopeless, but it is not so bad after all.

The first thing to do is to skin off the turf, and this should be done in the winter or early spring. If the main part of the turf does not contain any twitch-grass, or weeds like thistles, coltsfoot, docks, and dandelions, a heap should be made of it in a corner of the garden. If, however, these weeds are numerous, a fire should be made with sticks, and when as much soil as possible has been shaken out of the turf it should be burnt.

Now dig two or three holes in different parts of the ground. If there is good or fairly good soil down to the bottom of the holes, you are in clover. But probably you may find you cannot go down more than 1-2 ft. before coming upon rock or shale, sand or clay. Sand and clay, of which there are many kinds, are the easiest to manage. If you come upon rock it is really serious work to get it out and fill in with soil.

However, we will leave the details of soils and their management till a later stage. The best thing to do at this stage is to dig the ground over as deeply as you can, mixing in some rotted stable dung and sand; and also the ashes from your turf fire if the soil is inclined to be clayey, and some cow manure if it is sandy.

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You may, however, be less fortunate and take over a plot "made" by the builders. The soil of such a plot is generally thin, and rests on all sorts of builders' rubbish. The only thing to do is to dig it over, picking out large stones and broken bricks. These will be useful in many ways, and should be thrown into a heap in a corner.

You have now a large plot nicely dug over, and wonder how you are going to turn it into a garden full of blazing colours, such as some friend of yours had last year. The next thing to do is to decide on a garden scheme. You want to grow annuals, biennials, and perennials as your friend did, and you shall.

A good scheme for a small garden is this. Have a plot of grass in the centre, and borders of flowers on all four sides. A good wide path, made by beating down the earth, round the outside of the borders, and two smaller paths across them, by which to enter on to the central grass plot.

You need not have the centre plot entirely grassed. Square or circular beds may be left and soon filled with plants. Or you may have a rock-garden in the centre instead of grass, this would be a constant source of interest. And other ideas will occur to you.

At this point a warning is needed. In planning a garden it is necessary to consider the surroundings, and the surroundings of the garden are of course the house—built of bricks and mortar, or of stone which is so much less glaring. Further on in this book the reader is recommended to avoid straight lines, and to have winding paths, curved borders, and so on. But here, near the house, is where formality is desirable; straight and level paths are in keeping with bricks and mortar, and anything else would look incongruous. But keep formality near the house and plan out your scheme to merge into what is less formal as you get away from it.

Having settled on the general scheme of your garden for the first year, you can now proceed with the practical work. Temporary paths to get about on, should be well beaten down with the spade, and made as hard as is possible.

Paths on which a barrow has to be wheeled should be 4 ft. wide, and 4½-5 ft. is none too much.

If you decide to have grass in the centre get some thoroughly capable man from a nursery to lay the turf. If you decide to make a rock-garden, the stones should be wheeled on to the plot. They can then wait a bit, for you have much to do before you have time to build rock-work.

Perhaps you wish to grow as many hardy flowers as you can. Then perennials must be your first thought. If your garden faces South, cut off 10 ft. wide at the top end of it, and make this your perennial border. The best time to plant perennials is from November to March, and if you get a few roots of such perennials as *Doronicums*, *Anchusas*, *Erigerons*, *Chrysanthemum maximum*, *Lupins*, *Pyrethrums*, and *Michaelmas Daisies*, and plant them firmly in the soil 2-3 ft. apart each way, they will make a brave show in the summer.

When these are planted you can think of the other parts of the garden. If you have made a long border running North and South, or facing any direction save North, nothing will look better in it than early-flowering border chrysanthemums. Rooted cuttings of these can be obtained in February and March, and if they are planted in a frame, made out of a packing case and some old glass, they will grow strongly, and be ready to plant out in April.

Another sunny border may be reserved for Dahlias if you wish. For my own part I do not care for them, but no doubt they are very showy. Roots ready for planting can be obtained in April and May.

We now come to summer bedding, and to the use of hardy annuals for filling beds and borders. Every amateur gardener prides himself on his border of summer bedding. Later on I shall show how he may outdo his friends and neighbours if he displays originality in this direction. But for the moment I say: keep a good long border reserved for summer bedding, and do not have it more than 4 ft. or at the most 6 ft. wide. If, however, the plot left for

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bedding is a wide one, run a path through the middle of it and have summer bedding on both sides. Of course if tall bushy things such as *Godetias*, *Antirrhinums*, *Helichrysums*, and *Calendulas* are to be freely used, wider borders may be made, but for dwarf subjects 4 ft. is ample.

A large border or several small ones should be devoted to Hardy Annuals. In the following chapters I shall explain how to grow them, and name some good sorts. Borders devoted to Hardy Annuals may be of any width. But for dwarf plants alone it is advisable to have fairly narrow borders in order that each individual clump of plants may be easily attended to. Many hardy annuals are extremely interesting and remarkably beautiful plants. The borders reserved for them should in all cases be sunny ones.

But there is another sort of garden to which the amateur may come, an old one, shaded and overhung by trees. The ground full of tree roots, and as hungry as the Sahara Desert.

Yet there is hope even here. The best advice I can give is first to see the landlord, and represent to him that you are keen on gardening, that you are thinking of joining the R.H.S. ; and that you feel sure he, too, is a keen horticulturalist at heart, and will be interested in your work ! Then speak about the trees, ask him to permit you to have some of them down, or at any rate to allow you to have them cut back. It is not likely he will object if you have chosen your time well, and represented the facts to him in a true "horticultural" way. If in the end the trees are cut down, it is important that the stumps should be grubbed out, or they will rot and fungus will grow.

When the stumps are out and the litter cleared away or burnt, dig the ground over as deeply as possible, cutting up any tree roots with the grubbing axe, and burning these also. Work in plenty of manure, preferably farmyard manure, as you proceed, for such ground is always hungry.

In this case beds and borders may already exist, but you can extend and improve them as you think fit.

Unless the trees are taken down, a part of the garden will be more or less shaded from the sun. Such a spot is always a difficulty. It is often given over to ivy and weeds ; but if spare soil can be obtained, make a mound here, supporting the soil with a few stones and burrs, and plant hardy ferns on it. Beginners often make the mistake of attempting a rock-garden in such a place, but no error could be greater. A rock-garden in dense shade would only grow hardy Ferns, London-pride, *Cerastium*, and two or three other plants. All true rock plants revel in sunshine, and loathe damp shady places where there is continual drip from the trees. A rock-garden, if made at all, should be in an open sunny spot, such as the centre of the garden.

Having planted your perennials, the rock-garden may if you wish be taken in hand as described in Chapter X. Rock-gardens may be constructed at any time from October to April, and the plants set in the soil either as the work proceeds, or when it is completed.

The next thing is to think about getting seeds of annuals and biennials, and as a matter of fact perennials also. Selections of what to grow will be found in Chapters IV, V, and VII. With ordinary care any of them will give excellent results, but as some things will not thrive in all localities, the best course is to consult a good local seedsman on plants which will do best in your locality and soil. April is the best month to sow annuals in the open ground, and March in pots, so that the first few months of your gardening year will be busy ones.

I would urge upon the beginner the wisdom of getting plants started in the garden as soon as possible. Some people advise us to make our paths properly, get all our borders edged, put up pergolas, arches, and poles, build pits, frames, and so on before anything else ! But no ! These folks are wrong. All these things can be done later if need be. Unless we can begin early in the autumn,

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soil paths, or paths covered with coal ashes must satisfy us for a season, or we shall have to go a year without flowers. It is plants and flowers that count. Get them started in the borders, sown in your frame (though it be only a packing case), and if necessary defer other things till later on. Autumn is the time to make your paths, build your frames and pits and arches. Then things can be done "as they should" according to our friends, and not in the "topsy-turvy manner" I suggest.

CHAPTER III.

A GARDEN OF ANNUALS.

ANNUALS may be divided into two great groups, (1) Hardy Annuals, and (2) Half-Hardy Annuals. I treat these two groups separately in detail.

(1) HARDY ANNUALS.

A great many people say they never succeed in growing Hardy Annuals; this is astonishing, as many of these plants are quite easy to cultivate. Years ago in the days of the old hardy annual, one could imagine people not wishing to grow them, for some of them were poor, and the colours dull and lifeless. Now, however, things have changed. Thanks to the skill of the hybridist and the patience of the traveller and collector, some of the loveliest of our garden flowers are hardy annuals. Countless examples might be named, and to those who are fond of old favourites, I would say that the newer things are not "new fangled" things, but real improvements and beautiful flowers.

There is, however, one great exception in the old and the new annual corn-flower. Grow them both for a year or two, and you will see what I mean. The new is certainly no improvement on the old. The old sort is blue, there is no mistake about it, no possible mistake; but of some of the new varieties, we cannot say what their colours are. But this is the exception. The rule remains the same. It is generally better to grow the newer varieties. The

habits of the plant are more "refined," and the colours and sizes of the flowers themselves are nearly always better.

Many hardy annuals are most useful to use as cut flowers; they look beautiful on the dinner-table, especially in artificial light. I hope, however, to deal fully with this subject in Chapter XX.

Sowing in Pots and Boxes:—We have often been told that "a hardy annual is a plant to be sown where it is to grow," but this maxim, though true twenty years ago, is now a mistake. Numerous annuals are better sown where they are to grow, but nearly all of them can be successfully transplanted, and indeed in some places it is impossible to get them to grow if sown outside.

In my own garden, for instance, living as I do in an exposed part, on to which the winds blow straight from the Derbyshire Moors, and much troubled by birds, I find it is better to sow a good many of my hardy annuals in pots and boxes, and plant them out later. This is specially the case with *Acroclinium*, *Erysimum*, *Xeranthemum*, *Schizanthus*, *Dimorphotheca*, *Omphalodes*, *Tulip* *Poppy*, and *Mignonette*. Others, however, like *Calendula*, *Candytuft*, *Clarkia*, *Cyanus*, *Calliopsis*, *Jacobea*, *Eutoca*, *Godetia*, *Larkspur*, *Nemophila*, *Saponaria*, *Silene*, *Convolvulus minor*, *Malope*, and *Virginian Stock*, come up splendidly when sown outside, but I usually sow in pots and boxes in March to get them to flower earlier. My method of growing them is as follows:—

Crocks and rough compost are put over the drainage holes of the pots and boxes, which are then filled up with light loamy soil containing plenty of sharp silver sand. The seeds are sown thinly on the surface of the soil, and covered with very little soil. The pots are then watered with a fine rosed can, and put in a warm dark cellar. As soon as the seedlings germinate, the pots are gradually brought to the light, and are subsequently stood on bricks or ashes in a cold frame. They are kept well watered, and when large enough, transplanted into other boxes 2-3 ins. apart each way; and they are finally planted out

in May after being well hardened off. I find this method highly successful and grow a number of hardy annuals in this way.

To go back now to our original point that "a hardy annual is a plant to be sown where it is to grow," let us take the case of Mignonette. Many people say they cannot transplant mignonette, but I grow a great many plants, and transplant them with ease.

How is it done? Well, in this little book there are to be no secrets from my readers, so I will tell them how I transplant.

The night before transplanting, all the hardy annuals in the boxes are well watered. The plots they are to go in are also generously soaked with water, and in the morning the plots are soaked again. By the afternoon, if the morning has been fine (in May and June), the soil is in a nice condition for planting. The Mignonette and other annuals are removed from their boxes and planted in the borders with as little delay as need be and are watered at once. They are kept well watered and soon pick up and grow strongly.

Sowing in the Open Ground :—There are, however, many hardy annuals, especially some of the dwarfer sorts, which it is less trouble to sow in the open ground where they are to be ; and much the same applies to certain taller annuals such as Shirley Poppies, Godetias, Clarkias, and *Convolvulus minor*, provided that clumps of a fair size are required.

Only those which are not over 12 ins. high should be sown in lines. Clumps are much better, and the taller the annual the bigger the clump should be. Clumps of the four annuals named, look well if they are 2-3 ft. across. "Clumps" of tall annuals, only 9 ins. or so across look ridiculous and are also extremely difficult to manage.

The question of colour enters into the operation of sowing, but here I will merely say do not put clashing colours near together. I will deal more fully with this subject of colour in Chapter VIII.

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The arrangement of the clumps has also to be considered. The novice and "pen-gardener" say: "Put the dwarfest at the front and the tallest at the back." This is the popular idea, and is often so well carried out that the plants slope down from the tallest to the dwarfest at an almost constant angle. But this is mistaken art. When you see a border in which the gardener has put some tall bold clumps near the front you admire him for his courage, and like the bold border much better. So my advice is: Do not think too much about the heights. Have courage and put bold clumps occasionally near the front. They will look nice.

Having given this preliminary advice, I now pass on to the operation of sowing. The soil having been previously dug up and well manured, it should be raked to a fine surface with a rake, the teeth of which are not too long. The ground should be got ready some morning in the first week in April, and the seeds sown the same afternoon.

In sowing, scatter the seed *thinly* over the soil, first marking out the shape of the clump with a stick. The seed of many of the hardy annuals is very small, and may be mixed with ten times its volume of fine sand, and the sand and seed sown together.

Great care should be taken to sow *evenly*, and a calm day should be chosen, or the seed will be blown away. Nothing is more annoying than to have bare patches in parts of the clump, and in other parts seedlings coming up so thickly that they stifle each other. This may be avoided if the seed be sown *thinly* and *evenly*.

In sowing the seed out of doors it is well to cover it lightly with fine soil. If the ground is dry it should be gently watered, and some means taken to keep off the birds; black cotton stretched on sticks across the plot is effective.

If the weather is dry after sowing, water regularly through a fine rose every evening, for it is specially important that the seedlings receive no check when they have appeared. If the nights are cold and inclined to be frosty, do not water till the morning.

Thinning Out and Tying Up :—When the young plants are 2-3 ins. high, the important operation of thinning out should commence. They should be thinned out to 1-6 ins. apart each way. Pull up the weakest of the plants; do not, except in the rarest circumstances, pull up strong plants to give weak ones a chance.

This may seem "unchristian," but it is not so. A lady gardener once denounced me as "very unkind" to pull up and destroy the weak plants. But I pointed out to her that really I was doing the kindest thing I could. If the weak plants remain they lead miserable lives for a time and then die. Far better to have them up and end their sickly career, than to let them linger on in that state.

Those who have never had the heart to thin out their plants properly should take courage. It is a great shame to let too many plants remain on a square foot of ground, for it means that none of them do their best. Better grow two good plants covered with bloom than twenty-two sickly seedlings with hardly a flower showing. If gardeners could be persuaded to thin out hardy annuals really thoroughly, even up to 9 ins. apart each way, they would get finer flowers and much better plants.

However, we must return to our practical work. Dwarf annuals should be 2-3 or even 4 ins. apart, and plants like *Clarkia* and *Godetia* 6-9 or even 12 ins. apart, except in the case of "specimen" plants, which are referred to later on.

Shirley Poppies and a few other annuals need not be thinned so much, 1-2 ins. apart each way is enough. They then support each other to a certain extent, and look very well when grown *en masse*.

One thinning is never enough, it is impossible at one effort to complete this heart-rending task. It should be repeated after an interval of two or three weeks, and after this second thinning, a third one may be needed a fortnight later.

And here is a practical hint: in thinning be gentle at your task. In any case you will loosen some of the other seedlings which you wish to remain in the clump. So give

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your border of annuals a good watering from a fine rosed can as soon as you have finished for the day.

Now about the tying up. If small twiggy pea-sticks are pushed into the clumps as the taller plants grow, they will grow up in amongst the sticks and support themselves.

Where only two or three tall plants go to a small clump, each plant should have a small green-painted flower stick to itself, and the sticks should be of appropriate height and not too thick. For annuals 3 ft. high, buy flower sticks 3 ft. long. It is as absurd to put a pole 5 ft. long to annuals 3 ft. high, as it is to put a stick of 2½ ft. to support sun-flowers. Some of my readers may say they would not make any such mistakes, but I have seen it done.

If, however, the plants are grown more or less *en masse*, and the clumps are fairly thick with growth after generous thinning, the "single stick" system cannot be applied. In dealing with such clumps I find it is best to put in from 3-8 flower sticks round the outside of the clump, and then connect them with raffia. If put in carefully, the sticks soon get concealed by the growth of the plants, and the clumps so treated look really well. Some people only put a stick at each side of the clump, they say that two sticks for one clump are ample. But I have found two seldom if ever enough, the raffia connecting them produces a "bunched" effect which is the opposite of what should be desired. On the other hand, too many sticks should be avoided, or the border will become a "forest of flower sticks." The beginner should exercise his discretion, use the minimum number of sticks, but avoid bunching the plants.

I make a strong point of tying up the plants early. Amateur gardeners are apt to neglect doing this till the plants are showing bud; by that time they have so much foliage to support that they begin to fall about. When they have once seriously fallen over, all chance of obtaining artistic and natural looking clumps is gone, for in attempting to set them to rights it is almost impossible to avoid "bunching." As soon as the plants are from 6-9

ins. high (and they grow rapidly if the weather is good), bring out the sticks, and give the clumps a tie. Then repeat giving ties, and if need be add a few more sticks each week till the plants are fully grown. Thus you will save yourself disappointment, and your annuals will be worth seeing.

Watering and Feeding :—In dry summer weather hardy annuals need regular watering, for many of them are thirsty subjects. The watering recommended in the early stages from a "fine rosed can" is now useless, except for some of the more dwarf and delicate subjects. What they need, especially the clumps, is a good soaking at the roots, and this should be given every evening when the sun has lost its power. Hardy annuals, if watered at all, must be watered thoroughly, a drop to-day and more to-morrow is a bad principle. Some people say that plants love to have sprinklings in the evening. Yes, but these sprinklings are over the foliage and do not benefit the roots. Water, lightly sprayed over the foliage, will freshen the plants, but it will not make the roots less thirsty, nor does it benefit the plants themselves to any great extent.

Then as regards feeding. If the ground has been well prepared and enriched with good manure and the clumps are properly thinned and weeded and watered, no feeding of any kind is necessary under ordinary circumstances. I know very well that people are fond of feeding hardy annuals, some even regard feeding as essential to success. But as far as my experience goes, hardy annuals are better without it, except in the case of "specimen" plants, referred to later on.

Cutting the Flowers :—I shall speak about hardy annuals in the chapter on Cut Flowers, but before leaving the subject of their culture I must add that success depends largely on the flowers being freely cut. Of course you wish your border of hardy annuals to be gay with bloom all the summer, and the best way to get it is to cut the flowers freely.

Amateur gardeners can seldom be persuaded to see this.

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But think about it for a few minutes. The plant's object in life is to ripen seed, and when it has done this its task is over and it dies. If we allow the first flowers to remain on, and the seed to ripen, the plant dies before the summer is half over. But if we cut the flowers, or at any rate the dead flowers, and do not permit the plant to ripen seed, then more and more buds and flowers form as the season goes on. By this process of cutting flowers generously, and removing all dead flowers, the lives of most hardy annuals can be extended throughout the summer.

So my advice is: "cut generously." You need not go over the border and cut all flowers off, although if you did you would soon have more opening. Some annuals are not suitable for cutting, but cut the suitable ones generously and remove all dead flowers and seed vessels from the rest at once to prolong the blooming period. This removal of dead flowers should take place at least twice a week, and if it be done every day so much the better.

Do not worry about seed saving, it looks very easy and sounds easy, but it is not worth it in the long run. Good seed can be had very cheaply, so amateurs should leave seed-harvesting alone.

"Specimen" Plants:—The word "Specimen" is here used to signify something extra good. "Specimen" plants of hardy annuals are single plants which have been highly developed by extremely good cultivation. For instance, a specimen plant of *Godetia* easily develops into a kind of small bush 9-12 ins. or more across, so it differs very considerably from a plant cultivated in a border in the ordinary way.

Some people do not like specimen plants. They say they look artificial, but there is no doubt that "specimen" plants yield better flowers and in greater quantity than ordinary plants; on the other hand they are more trouble and take up much more room.

The secret of success lies in making an early start. If you have a heated greenhouse sow the seeds in boxes of light soil and put the boxes there early in March or better

still late in February. Put sheets of glass over the boxes till the plants appear, and be sure to sow the seed thinly.

Good subjects to start with are Giant Red Mignonette, *Godetia Schamini* fl. pl., *Clarkia elegans* and *integripetala*, and *Convolvulus minor*. Other suitable annuals will be named in the next chapter.

As soon as the seed has germinated, put the boxes on a light airy shelf near the glass and grow on as quickly as possible. When about 2-3 ins. high, pot separately in thumb pots of light loamy soil, putting the pots on a shelf close to the glass. Be careful neither to under or over water the pots, for no check must result.

When the plants are nearly 6 ins. high pinch out the tops, and turn a plant or two out of its pot to see what amount of root it is making. If the pot be full of roots, transfer the lot to 2 or 2½ ins pots and return to greenhouse for a short time. In early May or late April put the pots in a cold frame and harden off very thoroughly.

Now get ready the soil out of doors if this has not been done. It should be dug 2 ft. deep. Put in plenty of horse manure, but do not let any come within 9 ins. of the surface.

In late May turn the plants out of their pots and plant them 2-2½ ft. apart each way. Grow on as rapidly as possible, supplying water whenever it is needed, and spray the plants with warm water in the early morning. The first pinching will have induced several shoots to appear; and when these are a few inches long pinch again.

As the weeks go by shoots carrying flower buds will appear. But June and July are not the months to permit these plants to flower. Their glory should be reserved for August and September. So all the flower buds should be pinched out, and every shoot pinched as it grows unmanageable. "Specimens" require very careful staking: half a dozen sticks are often needed for each plant.

Throughout the summer it is very important that the ground between the plants should be kept well hoed, and the plants should be soaked with water every evening if the weather is dry.

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When June is out feeding may commence, and in this case feeding *is* essential to success. One of the liquid manures mentioned in Chapter XIX should be used.

Nevertheless a warning is needed. Feeding is essential but it may be overdone. Liquid manure should not be given more than three times a week, and when it is given it should not be over strong.

The feeding, commencing in July, should continue throughout that month, and through August into September. When the plants are covered with bloom it may be given a little stronger, for then the plants specially need it to keep them going. It goes without saying that the liquid should be kept off the foliage.

By the first week in August the plants should be bushy "specimens"; then the pinching must cease to allow the flowers to be produced. With good management the plants will soon be covered with bloom and will continue to flower for 6-8 weeks or longer.

To sum up the chief points which make for success:— Sow early in pots or boxes; pot on at the earliest possible moment; plant out in May in a rich soil; pinch the tops out of the shoots repeatedly till July 31st; stake early and generously; give quantities of water; and from July onwards feed carefully with liquid manure.

(2) HALF-HARDY ANNUALS.

We cannot say that Half-Hardy Annuals are not popular, for we see them wherever we go. But they have not increased in favour so much as hardy annuals and hardy perennials.

In half-hardy annuals we have most of the plants used for summer bedding—Stocks, Asters, Lobelia, annual Phlox, Tobacco plants, annual Chrysanthemums and many others. Included as half-hardy annuals are many which are really quite hardy, but which it is better to raise in this way, such as Jacobea, Helichrysum, and Calendula. I also include those which are really half-hardy perennials, viz.: Antirrhinum and Sweet Alyssum.

In the present section it is not proposed to speak about

the arrangement of these half-hardy annuals in bedding out, but merely to give their cultivation. The subject of their arrangement is dealt with in Chapter IX.

With half-hardy annuals a very early start should be made; shallow boxes filled with light loamy soil and plenty of silver sand on the surface prepared, and the seeds sown in late January or early in February. A warm dark cellar is the best place for the boxes till the seedlings germinate, and when the plants show above the soil the boxes should be put on a shelf near the glass in a warm greenhouse. As soon as they are large enough to handle comfortably, prick the seedlings off 3 ins. apart each way into other boxes of similar light soil, water, and again place on a shelf in the heated greenhouse near the glass, or they may be placed in a heated frame. Care should be taken not to over water, or the soil may become sour and the seedlings damp off. A happy medium must be struck.

Early in May, if not before, the boxes should all be transferred to a cold frame and ventilated freely on all fine days. Then gradually harden them off, and for a week before planting out remove the frames entirely, unless there is actual frost.

The ground for half-hardy annuals should be dug up and manured with stable dung a few days before they are planted out. If it is at all dry it should be soaked with water the night before, and the half-hardy annuals planted out next morning.

Great attention must be paid all the summer to well watering the beds and borders containing these plants, otherwise they will be ruined. No feeding of any kind is necessary.

A LIST OF HALF-HARDY ANNUALS.

This list of Half-Hardy Annuals includes a few plants which are strictly Hardy Annuals, and one or two Half-Hardy Perennials. For details of the colour and habit, and, with the few exceptions given, for named varieties, readers must study some good catalogue.

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	Height	
Ageratum, Imperial Dwarf Blue	9	inches
„ Mexicanum	12	„
Alyssum maritimum (Sweet Alyssum) ..	9	„
Amaranthus Melancholicus ruber ..	12	„
Antirrhinum (Snapdragon), Giant Mixed	30	„
„ majus (Get named sorts) ..	24	„
„ intermediate (Buy named Varieties)	16	„
„ Tom Thumb	6	„
Arctotis breviscapa, and grandis	6-24	„
Aster, Giant Comet	24	„
„ Southcote Beauty	30	„
„ Sutton's Superb Bedding	12	„
„ Veitch's Miniature Bedding ..	9	„
Balsam (Florists' Varieties)	18-24	„
Brachycome iberidifolia (Swan River Daisy)	6	„
Browallia grandiflora	18	„
Calceolaria (Bedding Varieties)	9-24	„
Calliopsis Crimson King (and other named sorts)	6-9	„
Canna, M. Crozy (Varieties)	24-36	„
Capsicum (Various Varieties)	18	„
Celosia Crimson Beauty	12	„
Centaurea candidissima	12	„
Chrysanthemum (Many annual Varieties)	6-24	„
Dianthus chinensis	9-12	„
„ Heddewigii	6-9	„
„ Laciniatus	12	„
(Strictly speaking these three are hardy and half-hardy biennials)		
Dimorphotheca aurantiaca hybrida (Golden Star of the Veldt)	12	„
Echeveria secunda glauca	3-6	„
Helichrysum (tall, large flowered) ..	36	„
„ nanum	18	„
Ice Plant (Mesembryanthemum)	3	„
Lantana hybrida	12	„

	Height	
Lobelia, Dwarf Compact Blue	3-9	inches
„ Cardinalis (strictly a perennial)	24	„
Melianthus major	24	„
Mimulus Queen's Prize (and other Varieties)	6	„
Nemesia Suttonii (and other Varieties) ..	12	„
Nicotiana affinis hybrids	36	„
„ Sanderae	24	„
„ Suaveolens	36	„
Nycterinia selaginoides	3	„
Pentstemon (Florists' Varieties)	18-24	„
„ Large Flowered	24	„
„ New Dwarf	9	„
Perilla nankinensis	18	„
Phlox Drummondii, numerous beautiful Florists' Varieties	12	„
Portulaca (mixed)	6	„
Pyrethrum aureum (Golden Feather) ..	6	„
Petunia, Double Fringed	24	„
„ Large flowered Single	18-24	„
„ Striped Bedding	18	„
Rhodanthe maculata	9-12	„
Salpiglossis, Sutton's Large Flowered ..	36	„
Salvia farinacea	24	„
„ coccinea alba	24	„
„ „ splendens	18	„
„ Romeriana	6	„
Schizanthus Retusus	24	„
„ Pinnatus	12	„
„ Wisetonensis	18-30	„
Stock, Ten-Week (Named Varieties) ..	12	„
„ East Lothian	12	„
Tagetes signata pumila	6	„
Verbena, New Dwarf	6-12	„
„ Mixed Bedding	4-6	„
Zinnia, Giant Double	30	„
„ Double Dwarf	15	„
„ Single Mixed	24	„

CHAPTER IV.

SOME GOOD HARDY ANNUALS.

THE preceding chapter described at length the general methods of cultivating Hardy Annuals. In the present it is proposed to refer briefly about some of the plants themselves, to give assistance in deciding what to grow. As there are a great number of Hardy Annuals, it will not be possible to mention them all, but the following are some of the best.

Acroclinium :—This excellent annual has flowers somewhat resembling the Rhodanthe. It is one of the Everlasting flowers, and will grow freely in good garden soil, and flower all the summer. It is well to pinch the top out of the small main stem, and then the plant will become bushy. If sown in pots in March, and planted out in April or May, as advised for hardy annuals, good plants result. Or it may be sown out of doors in April. Give it a sunny position.

Good Variety.

Acroclinium roseum (gold and rose) 1 ft.

Asperula :—This is a dainty little annual growing 9-12 ins. high. It succeeds best if it is not given a position in full sun. Its flowers are a pretty light blue, and the plant is a very charming one. It does not transplant very successfully, so it is better to sow the seed in April where the plants are to be, merely thinning out later on.

Good Variety.

Asperula azurea setosa (light blue) 9-12 ins.

Bartonia Aurea :—This is worthy of a place in any garden, with its handsome yellow flowers. It is not a

common plant, and few people know how grand it looks when grown in mass. It should be sown out of doors in April where it is to bloom; the plants reach a height of 1-1½ ft.

Calendula:—I have sung the praises of the variety *grandiflora* of this plant. It is an annual for everyone; if the soil is not too sandy or the shade too dense, it will grow and flower freely. My plants flowered this year for four months without stopping, dead flower-heads being picked off nearly every day. The largest blooms were 4 ins. and a great number 3 ins. across. Seed is best sown in pots in March, and planted out in April and May. When once the seed has germinated, the pots should be stood in a cold frame, or the plants become too forward before they are planted out. In early April I find it best to prick off into boxes 3 ins. apart each way, but some prick the seedlings out into the open ground at once. Seed may also be sown out of doors in March and April, and the plants thinned to at least 9 ins. apart. The best results are obtained when the plants are put in a border in the sunniest part of the garden.

Good Varieties.

Calendula

<i>officinalis</i> fl. pl. Meteor	..	..	..	1 ft.
Dobbie's Orange	..	..	..	1 ft.
<i>Grandiflora</i> Orange, Double	..	..		1-1½ ft.
Sulphur Queen (Yellow)	..	..	..	1 ft.
Prince of Orange	..	..	..	1 ft.

Candytuft:—The annual *Iberis*, known as Candytuft, is a deservedly popular hardy annual. It is a most accommodating plant, and will grow anywhere, so long as it has plenty of sun and water. It may be sown in long lines, or in large masses, and looks very well however it is grown. It also adapts itself well to the treatment (described in the previous chapter) of "specimen" plants, and for this purpose it may be bedded out. Candytuft should not be sown too thickly, or weak plants will result, and the plants should be well thinned out as they come up

to allow each to develop. If the dead heads are picked off more bloom will come.

Good Varieties.

Candytuft

Dark Crimson	..	..	..	..	1 ft.
Dwarf Pink	..	..	..	..	6 ins.
Little Prince	..	..	..	..	6 ins.
White Spiral	..	..	..	..	1 ft.

Clarkia :—This is an annual which deserves even greater popularity than it at present enjoys. It may be raised from seed and bedded out in the borders, or planted out in the mixed border ; or it may be sown out of doors in large clumps in April. Seed germinates freely and the plants must be well thinned. Three inches apart each way will do in clumps, but 6–9 ins. apart is none too much if they are planted out. If grown as “specimens,” 1–2 ft. should be the distance. Some say that *Clarkia* is unsatisfactory because it is inclined to grow “leggy,” but if it is given good treatment and the tops occasionally pinched out, good bushy plants may be obtained which will last longer. I think myself it is a grand plant, and it succeeds very well in town gardens.



Good Varieties.

Good varieties are numerous. Below are a few. For others refer to some good catalogue :—

Clarkia

elegans fl. pl., Brilliant	..	..	..	2 ft.
„ „ „ Purple Prince	..	..	..	2 ft.
„ „ „ Sutton's Firefly	..	..	..	2 ft.
„ „ „ Double Salmon	..	..	..	2 ft.
integripetala marginata	..	..	..	1½ ft.
pulchella (Many Florists' Varieties)	..	..	..	1½ ft.
„ Sutton's Brilliant Rose	..	..	..	1 ft.

Collinsia :—This is a small but neat growing and very charming hardy annual. Seed may be sown out of doors where the plants are to grow, or it may be sown in boxes early and planted out. *Collinsia* may be used for summer bedding, or may be sown in the mixed border. Given

good soil it flowers well. It may also be used as an edging plant for summer borders, and is then very effective.

Good Varieties.

Collinsia

bicolor,	..	..	..	..	..	9-12 ins.
candidissima	..	..	..	..	..	9 ins.
grandiflora	..	..	..	..	..	12 ins.

Convolvulus :—Here we refer only to the variety minor. *Convolvulus major* is a half-hardy climber. The minor variety is, however, one of exceptional beauty ; and if a good Florist's strain be obtained containing mixed colours, large clumps will be a joy all the summer. Good results are obtained if the seed is sown thinly out of doors in late March or early April ; the soil should not be too rich. As soon as they are up thin out 3-6 ins. apart each way and stake the clumps early. The plants may also be grown on the "specimen" system referred to in the last chapter, and give extraordinarily fine results. The flowers resemble single *Petunias*, and may be had in many colours ; there is a double variety, but I prefer the single. The plants reach a height of 1-2 ft., and should have plenty of water, though they will grow freely even if they do get somewhat dry. There are several named varieties, but it is better to go to a good florist and ask him for a packet of his special strain. My own plants never ceased blooming all the summer.

Cyanus (*Cornflower*) :—The botanical name of this annual is *Centaurea Cyanus*, and this conceals from us that favourite old annual the Cornflower. I spoke of it in the last chapter, so only add here that it should be sown thinly where it is to grow, in April. Its height is 2 ft.

Good Variety.

Centaurea

<i>Cyanus minor</i> (old blue)	2 ft.
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Some of the newer varieties, of which there are plenty, may also be tried. The new dwarf is perhaps the best of these.

Erysimum :—This annual has not come up well when

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sown outside in my own garden. I find it better to sow in boxes and plant out later. But even so I am not particularly fond of it, and only include it because some people think highly of it.

Good Varieties.

Erysimum

Arkansanum (orange)	..	..	..	1½ ft.
Peroffskianum (yellow)	..	..	..	1½ ft.

Eschscholzia :—This is a splendid annual, and the varieties *crocea fl. pl.* and *Mandarin* are specially brilliant. These plants may be used for a great variety of purposes ; they can be planted in mixed borders, in borders of summer bedding, and they will fill small lawn beds with the most brilliant colours. Sown in large clumps in April, the plants soon appear and flower all the summer. For bedding out sow in March or earlier in gentle heat, and plant out in May. *Eschscholzia*s must not grow too thick ; 3 ins. apart in the clumps is enough, but 6 ins. or more must be allowed for transplanted specimens. It is essential that the long seed-vessels should be regularly removed to continue the period of blooming. Some writers advise sowing the seeds in the autumn, but I never practise autumn sowing of this or any other hardy annual now. Experiment has shown that it is too cold and damp in the winter here for the plants to stand it.

Good Varieties.

Eschscholzia

Californica (rose, cream, and yellow)	..	..	..	1 ft.
caniculata rosea	..	..	..	1 ft.
crocea fl. pl. (orange)	..	..	..	1 ft.
Mandarin (orange)	..	..	..	1 ft.
Mikado	..	..	..	1 ft.
Miniature Primrose	..	..	..	½ ft.

Eutoca :—This is one of the best intense blue annuals. Bees are fond of it, and a big patch of the plant looks very striking if put near the front of the border. Sow in early April where it is to grow. Do not touch the plant with the naked hand as it irritates the skin,

Good Variety.

Eutoca viscida (intense blue) 1 ft.

Gaillardia:—Many Gaillardias are perennials and very fine perennials they are; the best of the annual sorts are, however, included in the *picta Lorenziana* section. Their colours are various brilliant shades of yellow, and scarlet, and The Bride is pure white. Annual Gaillardias may be sown out of doors where they are to grow, or they may be sown earlier in pots or boxes in frames, and planted out. In height they range from 6 ins. to 1½ ft.

Gaura Lindheimeri:—I have not yet grown this in my garden. Opinions on it differ a good deal; a gardening friend near Oxford speaks very highly of it, others say they have seen many better things. But one point is certain: it must be well grown if grown at all. It is really a perennial, but it is better to raise it in a frame in March as a hardy annual, or even sow it in February as a half-hardy annual, and plant out in May when the plants are of fair size. The soil should be good and the plants must not be put too close. Height 2 ft.

Godetia:—No praise is too great for this most beautiful hardy annual. Like the *Clarkia* it may be used for a variety of purposes, and I shall refer to it in the chapter on Summer Bedding. Godetias are better than Clarkias to my mind, and they do not so easily grow "leggy," which is an advantage. They make admirable "specimen" plants, and for modern summer bedding and for filling in gaps in the mixed border they are quite indispensable.

The plants come readily from seed if sown in the open in early April. But for summer bedding out purposes it is better to sow in pots in March. Godetias require plenty of water, and should be in a sunny position. The plants look best in large clumps, and in these they should be at least 3 ins. apart each way. The dwarfer sorts are best for bedding out, but the taller ones show up better in mixed borders.

Good Varieties.

Named sorts are very numerous; those which follow are very good, for others the reader should consult a good seedsman's list:—

Godetia

Schamini	..	..	..	..	..	2 ft.
Bridesmaid	..	..	..	..	..	1 ft.
Gloriosa	..	..	..	..	..	1 ft.
Crimson Glow	..	..	..	..	..	1 ft.
Duke of York	..	..	..	..	..	1 ft.
Lady Albemarle Dwarf	..	..	..	..	..	$\frac{3}{4}$ ft.
Lord Roberts	..	..	..	..	..	$\frac{3}{4}$ ft.
Marchioness of Salisbury	..	..	..	..	..	1 ft.
Rosamund	..	..	..	..	..	1 $\frac{1}{2}$ ft.
Sutton's Double Rose	..	..	..	..	..	2-3 ft.

Many of these are described and illustrated in seedsmen's lists.

Gypsophila:—Everyone knows of the charms of *Gypsophila elegans* and *G. muralis*. The second, growing only 6-9 ins. high, finds its home most frequently in the rock-garden, but *G. elegans* is grown largely in the ordinary garden. It should be sown out of doors where it is to grow, in April, and a sunny spot should be chosen. It may be sown in lines, but looks best in good sized patches near the front of the border of annuals. It is most suitable to add to vases of cut flowers. Height 18 ins.

Jacoea:—This is a well-known and most useful bedding plant, height 6-12 ins. It is treated by many as a half-hardy annual, but is really quite hardy. Seed may be sown in a cold frame or out of doors in March or in April. For bedding out, the seedlings must be pricked off and planted out in May or June. It enjoys a sunny position, and can stand dry weather when once it is established. It grows like a weed, and is covered with flowers. The amateur will see in it a likeness to groundsel; it is of the same genus. Botanists call it *Senecio Jacobea*, or *Senecio elegans*.

The two best varieties are the double purple and the double crimson. The single *Jacoea* is poor.

Larkspur:—Little need be said about these hardy annuals; they are beautiful, and easily grown. The stock-flowered sort reaches a height of 2 ft. and the dwarf hyacinth-flowered 1 ft. There is a good range of colour to choose from in these varieties. Seed may be sown either outside where the plants are to grow or in a frame. Sow in March and April.

Leptosiphon:—The variety *L. densiflorus* is the best sort to grow, and in these annuals we have some very pretty dwarf plants to place in the front of our borders. They have blue flowers and should be sown where they are to grow. The height of *L. densiflorus* is 12 ins.

Linum:—There are many annuals better worth growing than the *Linums*, but many people are fond of them, so we must not omit them. *Linum grandiflorum rubrum* is the best. Its flowers are a good scarlet, and the plant reaches a height of 18 ins. Any soil will suit it; but as the plants do not transplant well, it is the best to sow in good sized clumps out of doors in April.

Lupinus:—The annual lupins are undeservedly neglected. I think the reason is that most people have the perennial varieties which are so good, and do not want both. But the annual sorts are very easy to cultivate, and may be sown out of doors. I find it better to sow in a frame in March and plant out. They succeed in any good soil, and the variety *nanus* may be used for summer bedding.

Good Varieties.

Lupinus

Hartwegii (mixed colours) 2 ft.

Nanus (white and blue) $\frac{3}{4}$ ft.

Malope:—One of the very best of Hardy Annuals, but it must be well grown or it is a very poor thing. Seed should be sown out of doors where the plants are to stand, in early April, and it is essential that large clumps should be sown, and that the seed be sown thinly. With plenty of water and careful staking, they will develop into fine plants

without any pinching at all. Malope has a very branching habit, and the plants are covered with bloom all the summer. As the growths are brittle, staking must be done early and with more than usual care. The plants grow so bushy that 1 ft. apart each way is none too much though 9 ins. will suffice. The colours are brilliant.

Good Variety.

Malope Grandiflora (crimson) 2 ft.

Mignonette :—We have already referred to this in the preceding chapter. Seed sown out of doors must be in a warm corner, and the soil must be made very firm as the seed is exceedingly small. Just cover very lightly with soil, and water, and when the plants come up, thin out to 6 ins. apart each way. In exposed gardens it is better to sow in boxes or pots in frames in March, pricking off in April, and planting out 6–9 ins. apart each way in May. Good “specimen” plants are easily grown. Mignonette must have plenty of water in dry summer weather.

Good Varieties.

Mignonette

Large-Flowered	..	..	..	..	1 ft.
Gabrielle	..	..	..	..	1½ ft.
Machet	..	..	..	..	1 ft.
Prizetaker	..	..	..	..	1 ft.

Nasturtium :—The tall Nasturtiums are to my mind out of place in any small garden. We call them Hardy Annuals, but they differ very widely from most of the other plants described in this chapter, and should strictly be termed half-hardy climbers. For covering banks, unsightly rubbish heaps, tree stumps, and other like purposes they are splendid, but in the ordinary border they soon smother everything near. But to the Tom Thumb varieties, many of which grow only 1 ft. high, I can give well deserved praise. Good sorts are King of Tom Thumbs, Ruby King, Golden King, and Ladybird. These nasturtiums should be planted in poor soil. Raise them in a frame in March, and do not plant out till late May for they feel late frosts. Keep the water-pot going till they are established, and in dry weather.

Nemophila :—It is not necessary to say much about this delightful annual, for it is one of the very easiest to grow. Seeds should be thinly sown in patches near the edging of borders in early April, and the plants thinned out and then left to themselves. A single plant will, in good soil, cover nearly a foot of ground. In the summer water well. They do not move successfully.

Good Varieties.

Nemophila

discoidalis elegans 6 ins.

insignis 6 ins.

Nigella :—This is the charming "Love in a Mist," and the double variety which is not so fine is known as "Devil in a Bush." The first is by far the best and is used for all purposes to which Hardy Annuals are put. It may be sown in lines or in large patches in the open ground in April, and a grand effect is produced if it is sown on the same bed as Shirley Poppies. It may also be used for summer bedding, but it then loses some of its charm, for it does not transplant well. It must have plenty of water in the summer and should not be sown in very hot sunny positions.

Good Variety.

Nigella hispanica atropurpurea Miss Jekyll .. 1-1½ ft.

Oenothera Drummondii Nana :—A beautiful yellow annual evening primrose. It should find a place in as many gardens as possible, and treated in the usual way for Hardy Annuals. Its height is 12 ins.

Phacelia campanularia :—I have sung the praises of this lovely annual, for it should be far more grown. Its flowers are a glorious blue colour, and the plant is very easy to cultivate. It should be sown where it is to grow, in April, and thinned later. Height 1 ft.

Poppies :—Those who have seen these growing will know what lovely things they are, and those who have not, should grow some without delay. There are innumerable varieties to choose from; the amateur should consult a good seed list; here are a few good sorts ;—

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Poppy

Carnation	2½ ft.
Pæony	2 ft.
The Shirley	2 ft.
Tulip	2 ft.
White Swan	2 ft.

I think readers should begin with the Shirley Poppy. I have grown it for years now, and each season I become more fond of it. The flowers are so brilliant and varied in colour, and the whole growth of the plant is full of beauty.

Poppies do not transplant well so must be sown where they are to grow, in April. The Shirley comes very readily from seed, but I find that some of the others do not. All Poppies should be sown in large clumps to get good effects ; and as well as being sown in the border devoted to hardy annuals, clumps should be sown near the front in mixed borders. It is a mistake to sow thickly.

Poppies enjoy a good deal of water, and to enable them to go on blooming, the dead flowers and seed heads must be cut off nearly every day.

Saponaria :—The dwarf variety, *S. calabrica rosea* (6 ins.), is the most useful of the annual Saponarias. I do not care much for the tall sort, *S. vaccaria rosea* (2 ft.), but both should be grown, for they are both showy. Either of them transplant readily, but the first suffers least. It should either be sown in April in the borders or planted out later in large patches near the front.

Schizanthus :—The two hardy annual *Schizanthus*, *S. grandiflorus* and *S. pyramidalis* (both 18 ins. in height), are grand plants. But in my exposed garden we cannot get them to grow and flower by sowing outside. It is better to sow in a frame in March, or even treat them as half-hardy annuals by sowing in January or February, planting out later. Then they give a splendid display. Some of the true half-hardy sorts may be grown into "specimen" plants, and very pretty they look. The hardy and half-hardy ones are good plants for summer bedding.

Silene :—The best sorts of this are *Silene armeria*, the

well-known Catchfly, and *Silene pendula compacta* double rose, and double crimson. The former is 1 ft. high, but the other two are only 6 ins. The *pendula compacta* varieties are useful for a great many purposes, they come readily from seed out of doors, or seed may be sown in a frame in March and the seedlings freely planted out later. They are most useful edging plants, and large patches of them near the front in borders of annuals or perennials look extremely well.

Sunflower :—Opinions differ about the merits of the sunflower. I am not so fond of it. There is no doubt, however, that the dwarf varieties are much better in a small garden than those which grow to a height of 12 ft. All sunflowers may be sown where they are to grow, in April and May, or they may be sown earlier and transplanted. Three to five feet apart is none too much for the tall sorts and 1 ft. for the rest.

Good Varieties.

Sunflower

Tall Double	..	..	..	..	6-12 ft.
Dwarf Single and Dwarf Double	..			..	3 ft.
Cucumerifolius	..	..	..	..	3 ft.
New Dwarf Compact	..	..	..	..	1½ ft.

Sweet Pea :—It is quite out of place for me to say anything about the cultivation of sweet peas in these Jottings, for although I am an enthusiast, abler pens than mine have gone into the matter fully. The best I can do is to recommend the amateur to read a good book on the subject or the frequent articles on Sweet Peas in the gardening papers. Let him get "The Modern Culture of Sweet Peas" by Mr. Thomas Stevenson.

Sweet Sultan :—This is a most valuable Hardy Annual and should be grown by everyone. It is easy to cultivate and may be sown out of doors where it is to flower, in April, or earlier in a frame and carefully transplanted. The colours are various shades of pink, purple, lilac, and white. The ordinary varieties grow 2 ft. high, but the hybrids (many named sorts) reach a height of about 36 ins.

Veronica Glauca :—This is a gem for sowing on the rockery or in patches close to the edging of the border of annuals. It only reaches a height of 6 ins., but its blue flowers are lovely. Seed should be sown in April, and the plants kept well weeded and watered. It is one of the best blue annuals.

Virginian Stock :—This is an annual for everyone, and it is an old favourite with many people. Sown in a long line in front of the perennial or mixed border it looks well, or large patches of it may be sown in the front of the border of annuals. It does not transplant well, so should merely be well thinned out. There are white, and various shades of rosy pink, and crimson varieties to choose from, but I like *Crimson King*. Height 9 ins.

Viscaria :—This is a fine hardy annual, and should be more grown. It is not often seen in gardens. Seed is sown in the usual way, and the plants thinned out when large enough. It may be sown on the rockery or used as an edging, but it should also be grown in large or fairly large patches. I prefer the blue form, but the others are good.

Good Varieties.

Viscaria

cardinalis (red or crimson)	..	..	..	1 ft.
cœrulea (blue)	..	..	..	1 ft.
oculata (pink)	..	..	..	1 ft.

Xeranthemum :—In the *Xeranthemum* we have a very useful everlasting flower. The double rose variety is the best to my mind, and reaches a height of 12 ins. Everyone should grow this annual; its difficult name hides a very fine plant, and one which is not difficult to grow.

CHAPTER V.

BIENNIALS.

IN seed catalogues there are comparatively few plants given as hardy biennials. But there are several plants which are really hardy perennials, but which should be treated as biennials. I now propose to give some general outlines of the cultivation of biennials, and to mention a few of the plants grown in this way.

As the name implies, a biennial is strictly a plant which takes two years to produce flowers and seeds, and then dies. But gardeners often use the term for plants which are sown one year to bloom the next, and which are then pulled up and thrown away.

One of the uses of certain biennials is for spring bedding. Wallflowers, *Myosotis* (forget-me-nots), *Arabis albida*, *Arabis albida flore pleno*, and *Alyssum sexatile*, may be used for this purpose. Other biennials such as Sweet Williams, *Oenothera Lamarckiana*, and Canterbury Bells, find a place in the mixed border. There is no such thing as a "biennial border," for there are not enough kinds of plants to put in. There is one objection, however, to planting Honesty, Sweet Williams, and Canterbury Bells, and that is that they become "over" at an awkward time (July); but this difficulty is surmounted by pulling them up and filling their places with late sown annuals.

[Cultivation of Biennials :—There are several methods of cultivating biennials. Some raise the plants very early by sowing the seed in January or February like half-hardy

annuals, and allowing the plants to flower the same summer. They are then left in the ground and flower the following summer and then die. I do not, however, advise this treatment.

Ordinary biennials are better sown in June and July. When large enough, prick off 6-9 ins. apart each way on ground which has been well dug up and manured. They should be watered and cared for, and in exposed districts a cold frame should be put over the beds as a means of protection in winter. In the spring, plant them out in well manured borders 1 ft. apart each way, and keep them well weeded. In the early summer when they are flowering, water such as Canterbury Bells and Sweet Williams freely, and give occasional doses of weak liquid manure. Sweet Williams and Canterbury Bells should on no account be used for spring bedding, as they are not over when the summer bedding has to be put down. Their place is in the mixed border or in beds to themselves.

Plants to be used for spring bedding must be sown in mid-June in well prepared end beds, and it is advisable to prick them out 5 ins. apart at the earliest possible moment into ground well cultivated and manured. They should be made to grow quickly in the summer, or they will not be fit for planting at the right time. Never let them suffer for want of water, and if in August they are not getting on, give a weak dose of nitrate of soda ($\frac{1}{2}$ oz. of the nitrate to a gallon or so of water). Or give clear soot water. Pinch the tops out of the wallflowers, if need be, to induce them to be bushy, and keep the beds free from weeds.

In the first week in October pull up the summer bedding plants and dig up the soil in the borders. Some old hot-bed manure should be dug in well down, and if bulbs are to be planted also, mix some sand in with the soil unless it is already sandy. If the beds are dry, as they sometimes are in the autumn, water freely the day before, and also water the bedding plants. Then on the next day lift the plants carefully, and plant them firmly in the prepared borders. Alyssum sexatile, Arabis, and forget-me-nots

make good edgings to beds of wallflowers. In very dry autumns it may be necessary to water once or twice after planting. This method is the most frequently adopted and is applicable to all true biennials.

But the Alyssum and Arabis are perennial, and with these a better method is to propagate from cuttings. Prepare two beds by digging deeply and adding some sand if the soil is heavy. The first bed should be in full sun, and both got ready in June or July. It will be found that it is not possible to get cuttings from Alyssum till July, so Arabis cuttings should be in first. Put in cuttings 3 to 4 ins. long, put them 4-6 ins. apart each way, peg them firmly in, and give a good watering. It is useless to attempt to strike any but new season's shoots. The old "wood" will take months before any sign of roots are thrown out, and then the plants will be weak. The cuttings should be left unshaded in the full sun and watered as needed. They will soon strike, and nice plants will be ready to put into the borders in October.

Alyssum is not quite so easy. A rough frame must be rigged up over the second bed, which should not be made in a very sunny spot. The cuttings, new growth 3-4 ins. long, should be pegged in as soon as plenty can be got, and watered at once. The frame must be kept shaded, and little air given for several weeks; then the cuttings will strike. After a time remove the frame and treat as for Arabis.

Too much stress cannot be laid on the great value of firm planting when the plants of biennials are finally bedded out for the winter. Moreover, early planting is essential. It is, perhaps, heart-breaking to have to disturb borders which are looking as bright as ever, in order to fill them with wallflowers and such plants, but it is very necessary. The work should be completed by the end of the third week in October, for by that time the weather may break at any moment, and break for good. Wallflowers do not, of course, object to being planted out during pouring rain, indeed they enjoy it, for they never look back or feel their removal

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at all. But such times are unfit for outdoor work, and every fine day in winter is a busy time in the garden.

There is a further reason for getting them in as early as possible. These plants have to make a certain amount of growth before they can flower. If they do not make some of it at this end of the winter they will have to make it all in the spring. What does it mean? Simply that it will be late before they start flowering, and will not be over by the time the summer bedding should be put out. The evils of being behind the times are great. Be early.

The following are some good biennials, including some which are really perennials.

Campanula pyramidalis :—This is really a hardy perennial, but as it nearly always dies in the second year after it has thrown up its flower spike, I include it here. It is a magnificent plant, and when in bloom reaches a height of 3-5 ft. Its place is in the mixed border, but it should not be placed at the back but rather towards the front, so that its glory may be seen. It requires staking early with a strong bamboo cane. Sown in June or July and transplanted it blooms the following summer. It can be had in two colours, blue and white.

Canterbury Bells :—These old friends are not nearly enough cultivated, except by cottagers and those who are called old-fashioned. Perhaps the reason is that referred to earlier in this chapter. But amateurs will miss some of the most beautiful flowers if they neglect to grow them. Some grow into huge plants completely covered with beautiful "bells" in the early summer, and if when the flowers are over the plants are cut down and watered in dry weather, a second crop may sometimes be obtained. I have referred to their culture earlier in this chapter, so that it is only necessary to add that they must have plenty of room in their flowering quarters. I consider the blue variety *Calycanthema* the best sort of the cup and saucer or semi-double Canterbury Bells. Of the other sort, the double blue and the single blue should be tried. There are also other colours including rose, mauve, and white,

which though very good do not reach the excellence of the blue. The height of Canterbury Bells is $1\frac{1}{2}$ – $2\frac{1}{2}$ ft.

Hollyhock :—This, too, is called by many a hardy perennial, but it dies or becomes too weakly to be worth having in the ground after its second or third year. If it is sown very early it will just flower the first year. If not sown till June, it will flower to a certain extent during the following summer, but will reach its best in the summer of the next year. Then it will die. Sometimes, however, if it is in very good soil it will manage even a fourth year, but that is unusual.

The best results are obtained by sowing early in heat. The plants should be hardened off and, after being pricked out into boxes, planted out in the reserve border in very rich soil. They should be urged on with water and weak liquid manure during the summer, and lifted and planted in frames for the winter. Then in February or March plant out in the perennial border in very rich soil, and stake as soon as they need it. Right through the summer they should be fed with liquid manure, and watered copiously, for they are thirsty subjects; also it is advisable to mulch them by putting a good layer of horse manure around their roots. They require repeated ties as they grow.

Good named florists' varieties of the double and single Hollyhocks are numerous, and there is a range of colour—yellow, dark red, pink, white, etc.—to choose from.

Catalogues give the height as 6 ft., but I have seen many 12 ft., and some few giants even taller.

Honesty :—This is a true biennial and very charming. It may be planted in the mixed border, and should be given a position which is not too sunny. It may also be planted in old walls, and does well wherever it is. It succeeds in town gardens, and in nearly every soil. When well grown, the plants are covered with flowers, and when over should be allowed to remain till the seeds ripen, for its large flat silvery seed vessels look very uncommon. Seed should be sown in June and July for blooming during the following

year. Three or four colours, notably crimson, purple, and white, are to be had, and the white is chastely beautiful. "Honesty is the best policy," so the more you cultivate in your garden the better! The height of the plant is 2-3 ft.

Myosotis Alpestris :—This rather formidable name conceals the well-known blue Forget-me-not. It is a lovely thing. Sown early in June and pricked off it is ready for spring bedding out in October. A bed on the lawn may well be given to it alone. It is really a perennial, but as it seldom survives flowering it is best treated as a biennial. There are several good varieties, but none beat the old blue, which ranges from 6-12 ins. in height.

There is a way of propagating it which has been proved highly successful here. Lift the old plants carefully when they are "just over," and replant them in good soil in a reserve border lightly shaded from the sun. They must be watered frequently and the seed will ripen. When ripe it will fall on the good soil round the plants, and seedlings will soon appear. By the time the old plants have withered away there will be a colony of seedlings ready to prick off.

Forget-me-nots may also be grown in the wall garden, where they reach a height of about 6 ins.

Oenothera Lamarckiana :—This has been mentioned earlier in the present chapter. It is a fine large-flowered biennial evening primrose, yellow, and reaches a height of 3-4 ft. It should be put near the middle of the mixed border and does not require any special treatment, beyond that given to other hardy biennials. It spreads rapidly.

Scabious :—The amateur must not confound this with the perennial Scabiosa. The Scabious is a hardy biennial, and a fine one too, but it is often raised as a half-hardy annual to flower the same season. If, however, it be treated as a biennial and sown in June, it flowers freely the following summer, and is most useful for cutting. It succeeds anywhere, specially at the seaside, and is recommended also to town gardeners.

There are a great number of varieties to choose from which I need not describe here. The Giant Mixed (height 3 ft.) is about the best, and flowers freely.

Sweet William :—The notes on Canterbury Bells apply also to some extent to the Sweet William ; the plants are very often grown side by side. The Sweet William is quite as much an old favourite with many people as the Canterbury Bells. Seed should be sown in June or July in good soil, and the plants pricked off and planted out in October. They will do moderately well in a comparatively poor soil, but it is better to give them a soil of fair richness if possible. A foot apart or more is none too much for really strong plants, though it looks a lot when they are first put in. Many of them bear very large heads of bloom, and there are some vivid colours.

When the flowers have been cut, lift the plants and transfer to the reserve border. In a short time they may be propagated by means of cuttings, or by layers, but it is only worth while to do this if the strains are extra choice. The plants so obtained may be planted out in October. The old plants should then be destroyed.

Good Varieties.

Good sorts are extremely numerous, and the reader is recommended to look through some good seedsmen's lists. The following should be tried :—

Sweet William

Sutton's Pink Beauty (Salmon pink) ..	1½ ft.
Sutton's Harlequin	1½ ft.
Sutton's Superb (many beautiful colours)	1½ ft.
Auricula-eyed	1 ft.
Large Flowered (immense heads of bloom)	1-1½ ft.
Double Crimson	1 ft.

Wallflower :—We have already said a good deal about the wallflower and have described how to raise it from seed. Double wallflowers may also be raised from cuttings struck in a frame made up on a bed of lawn mowings.

In cold districts it is essential to sow wallflower seed in good time to get the plants well on by October, and as

said previously they must not be left in the seed-bed longer than need be. They may also be grown in dry walls, as also may the *Erysimum*; a few seeds should be sown in pockets of soil in June, and kept watered through the summer. The best wallflower for this is a dwarf one, such as Old Castle, which is very hardy and reaches a height of 10 ins. Or if the wall garden is being built in the spring, strong roots of wallflowers may be planted as the work proceeds, and they invariably do well.

For spring bedding varieties, the amateur is advised to consult seedsmen's catalogues and choose for himself. I give a few of the varieties below, and he should on no account miss Sutton's Yellow Phoenix.

Good Varieties.

Wallflower

Sutton's Giant Bedder	..	..	12 ins.
Sutton's Giant Blood Red	..	..	18 ins.
Sutton's Giant Yellow ..	..	..	18 ins.
Sutton's Yellow Phoenix (flowers at Christmas)	..	..	18 ins.
Eastern Queen	..	..	12 ins.
Primrose Dame	..	..	12 ins.
Ruby Gem	..	..	12 ins.
Harbinger (early flowering)	..	..	12 ins.
Belvoir Castle (yellow)	..	..	12 ins.
Tall Double .. ..	..	..	18 ins.
Dwarf Double Branching	..	..	12 ins.

CHAPTER VI.

A PERENNIAL BORDER.

The "Mixed" Border :—I have referred in previous chapters to the "Mixed" Border, a feature which is too frequent in gardens. The word "mixed" is most appropriate. A lady gardener once told me she called her mixed border the "muddle" border.

A mixed border may contain practically any sort of plant :—Hardy Perennials, Half-Hardy Perennials, Hardy Biennials, Half-Hardy Biennials, Hardy Annuals, and Half-Hardy Annuals. For my own part I do not care for mixed borders. I like a good perennial border, or a border containing practically all perennials and a few hardy annuals.

I do not wish to denounce all mixed borders as bad features of the garden. Some wonderful effects can be obtained by judiciously mixing all sorts of plants together, and I have seen one or two such borders which made me somewhat envious. But these were exceptions. I am of opinion that it is not a feature which should be attempted by amateurs, but left to the experienced enthusiast who knows more than a little about the habits and colours of the various groups of flowers he is going to plant in it.

A Plea for the Perennial :—Some years ago a plea was made in the gardening Press for the greater use of Hardy Annuals, which are now deservedly popular. Then again summer bedding is also popular, although it is now a little on the decline notwithstanding that the new *Nemesias*, dwarf *Antirrhinums*, *Pentstemons*, and other plants have

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given it a flip again. Thus we have two very popular gardening features—hardy annuals, and summer bedding. Some say that they are too popular, but I do not, although sometimes the excess of hardy annuals is rather marked.

But here I make a plea for the perennial. It is a mistake to let the other kinds of garden features crowd out the perennial. Every garden should have a perennial border, except perhaps small villa gardens in which summer bedding looks best. Have a small perennial border if you cannot have a big one, do not leave it out altogether, unless you have no border in a sunny part of your garden 4 ft. wide.

Perennials are most interesting plants, they are nearly all free flowering, and from many of them useful flowers for table decoration can be obtained. There is no doubt that perennials are the finest of all garden flowers, and as they continue year after year they are also economical.

Many perennials succeed in town gardens, producing gay colours in the summer. It is said to be difficult to get a perennial border to bloom throughout the summer, but it is not really so.

Management of a Perennial Border :—The best site is a border facing due South, but if such a position is not available, then the next best position with good sunlight should be chosen. A border of very hardy perennials may face East if it gets a certain amount of South sun ; but few perennials will grow well in a border facing North, or for that matter due West either, for perennials want sun to enable them to do their best.

The season for planting lasts from November to March. In exposed districts March is much the best, but elsewhere November planting gives excellent results. For autumn planting the soil should be got ready as early in October as possible, and for March planting it should be prepared early in February.

If possible the soil should be trenched 3 ft. deep, or if not, worked to at least 2 ft. deep, for many perennials have very long roots. I shall describe trenching in Chapter XXIV, and explain how it is best done, here I will only say

that the soil must be well broken up as the trenching is in progress. If the soil be heavy, mix in plenty of sand and road grit and good rotted horse dung, but no manure must come within 12 ins. of the surface. If the soil is light and sandy, dig in lawn mowings and plenty of cow manure, which will help to strengthen it. If the digging be done early in the winter for spring planting, light soils may be "marled" or "clayed" in the manner described in Chapter XXIV. A period of fourteen days or better still three weeks should elapse between the digging of the soil and the planting of the perennials.

Strong roots should be obtained. These may be bought from any Nurseryman stocking perennials at prices ranging from 4*d.* to 8*d.* each. Special sorts of such as Pæonies, Pyrethrums and Verbascums may be 1*s.* 6*d.* to 2*s.* each or more. Buy good strong roots; don't be tempted by cheap lots from advertisements. I have tried many of these "lots," which though cheap were dear in the end.

If the weather is not suitable for planting when the roots arrive, "lay them in" in the garden. It is useless to plant in November or March if the soil is too wet to work properly. But if the day is bright and the soil as dry as it is likely to be, get to work at once.

Dig holes deep and large enough for the roots to go in without being bent or doubled up, and hold the plants straight up as you fill in the soil. Firm the soil round the plants thoroughly with your hands, and do not set them deeper than they were originally. The distances apart may vary; 1-1½ ft. is enough for small growing plants, but 2-4 ft. is not too much for bigger plants such as Lupins, Anchusas, and Delphiniums. It is not necessary to give these bigger plants all this space to themselves if it is so arranged that when they have been cut down the plants near them are such as come on later.

The subject of planting for colour effects is dealt with at length in Chapter VIII on Colour Borders. What I have already written in Chapter III on the arrangement

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of Annuals in regard to their height applies also to perennials. It is a mistake to plant too slavishly according to height. Of course the place for Michaelmas Daisies, Tall Echinops, Delphiniums, Anchusas, and tall Lupins, is near the back, but occasionally put a bold plant or two near the front. In one part of the border a small kind of valley of dwarf plants may run almost to the back of the border, terminated by a single good tall Lupin or Aconitum. Consider the plants described in the following chapter and make some scheme which will give a variety. Do not put too many plants which flower at the same time together in the same part of the border.

Perennial borders should be as wide as possible ; in small gardens not less than $3\frac{1}{2}$ –4 ft.; where space is available 12–13 ft. is not too wide ; but really fine effects may be obtained with 8 or even 6 ft. Narrow borders are less easy to manage, for in them the bigger masses of perennials, which look so fine in wide borders, appear out of place.

During winter after a thaw, go over the border and firm the plants again, for they will be loosened. If planting is carried out in March, water frequently and thoroughly if the soil or season is at all dry, otherwise a more or less severe check will ensue.

After an interval of two or three years most perennials require dividing. This is best done in November or March. The clumps are cut with an old carving knife. In many cases it is best to discard the old centre parts of the clumps and reset only the strong outside portions.

Perennials from " Cuttings " :—Many perennials, such as Doronicums, many Campanulas, Erigerons, Delphiniums, Phloxes, Pyrethrums, Sedum spectabile, and Stachys, may be propagated at the end of May or the beginning of June by means of cuttings. This is the most reliable way of increasing varieties bearing double flowers. Young shoots, the root-stocks if possible, should be cut just below the ground, for they may then have small roots on them ; but if they cannot be obtained take shoots which appear just above the ground. These should be prepared in the

usual way, slipping off just below a joint if possible with a sharp knife.

Have ready a piece of land in a half shady position and throw some old potting soil and some sand over it after it has been forked up. In the case of cuttings without rootlets, plant them with a dibber, pegging them firmly in, and give a good watering. Keep close and shaded by a hand-light over the beds, and sprinkle the plants freely overhead. These cuttings are sometimes shy at rooting, and the frame must be kept on till they begin to grow. It may then be removed gradually, accustoming the plants to light and air again. In early August transplant into rich soil in a sunny reserve border ; water freely till established ; and plant in their flowering positions either in November, or the following March.

Those " cuttings " which already possess small roots need no frame or hand-light ; nor any sprinklings. They should merely be planted 9-12 ins. apart each way in a semi-shady border of sandy but rich soil. They should be watered freely in dry weather, and kept well hoed, and will then be ready for setting in their flowering quarters in November.

Be sure to draw up the soil a little around the roots of the old plants from which small rooted cuttings have been taken, and give them a good watering each evening for some days afterwards, otherwise they will receive a check from which it may take them some little time to recover.

Perennials from Seed :—The most economical way of obtaining a good collection of perennials is to raise the plants from seed, and though this takes much time and patience, it is often worth it. A good way is to buy a few plants of some of the strong growing perennials and plant them in the border as a start, and then to raise others from seed to fill and extend the border later.

It is not so easy to raise perennials from seed as it is annuals, but it is not really difficult. Prepare a light compost of loam, leaf-soil, and sand and spread this 2 or 4 ins. deep over a plot of ground which has been well forked up.

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Choose a plot which does not get all the summer sun ; on the other hand the shade must not be at all dense or spindly seedlings will result. Raise a rough frame over the plot, and at the end of June or early in July draw shallow drills 6 ins. apart in the soil of the frame. In these drills carefully sow the seeds ; sow them thinly ; water well ; and put the light on the frame and keep close, shaded, and dark until the seedlings appear. As soon as all the lines show, gradually remove the shading and inure them to sun and air ; they must be kept well watered, but not to excess, or they will damp off.

By August they should be ready for pricking off, for which a plot which gets a good deal of sun should be chosen. Make the soil rich by digging in some old hot-bed manure not too deeply, and plant the seedlings very firmly, 9-12 ins. apart each way, or 6 ins. if they are not strong. Water well and keep the hoe and the can going through August and September, into October. If the winter threatens to be a cold one it is better to lift these seedlings, which should now be strong little plants, and pack them closely in a cold frame, planting out in their flowering quarters the following March.

Perennials raised from seed sown in the summer will flower during the summer of the following year, and should be allowed to flower freely if the roots were properly strong when planted out. But they do not come to their best until the summer after (two summers after they have been sown) ; it is a long time to wait, but it is worth it, for it is interesting work, and when the flowers come they amply repay for the patience and trouble.

Hoeing :—The after treatment of perennials is simple and important. Few amateurs realise how important it is for borders, especially new borders, to be hoed regularly at least once a week. Hoeing stimulates the growth of the plants, and at the same time lessens the need for watering.

But use the hoe carefully (I speak now of the Dutch hoe, the draw-hoe is useless for this purpose). Used roughly

it will damage the plants and do more harm than good. Weeds are sure to appear, but the hoe will keep them down ; if, however, there be many, rake or pick them off at once, or the first rain will restart them. With a little skill and practice the border may be hoed without leaving the surface untidy.

Staking and Tying :—This comes next in importance. Some plants need staking and tying very early, notably *Doronicums*, and nearly all tall perennials need stakes and ties during the summer months ; without support they fall about.

Erigeron speciosus only requires two or three small sticks and a couple of ties or so round each clump, and much the same may be said of *Chrysanthemum maximum*. The tall *Lychnis* and *Centranthus ruber* (Valerian) require the same treatment, only the sticks must be stronger and longer. Michaelmas Daisies should have one or more good sized stakes driven in close to the clump, and substantial ties. *Galega* requires a very strong stake, for with good treatment it grows into a regular bush. Tall three year old *Lupin* plants should have several strong stakes driven in round each clump, and strong ties. Each plant of *Helianthus* Miss Mellish should have a single strong stake, and the same with *Echinops*, *Anchusas*, and *Delphiniums*, but when the plants are very big several stakes may be required.

It is difficult not to " bunch " some perennials, notably *Galega*. The object should be to combine firmness and security with natural appearance, which is hard to do. Some amount of " bunching " cannot be avoided. Remember also to stake and tie as early as need be, otherwise the plants may get blown over in a single night, and be spoilt.

Mulching :—The advantage of mulching perennials in the summer is very great, especially on hot dry soils. The soil must first be well hoed up, and watered thoroughly. After watering, place a layer of rotted horse dung round the roots of the plants on the freshly watered soil. As

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much as 3 ins. of manure may be put, or even 4 ins., but 2 ins. is usually enough. A little soil may be sprinkled over it to make it less unsightly. Water through this mulch. It will be found that the plants suffer much less in the dry weather if this is done, and it is well worth the extra trouble.

Watering :—As many perennials are such big rooted plants and very thirsty, it is essential that if watering is done at all it should be done thoroughly. No rosed can is of much use for watering the larger clumps, it is better to pour the water into the clumps carefully from the spout of the can. Give each large clump at least three gallons of water in really dry weather, in the evening. The plants may then also be sprayed over the foliage. I shall deal with watering fully in a later chapter.

Feeding :—Any strong growing perennials may be safely fed with liquid manure when they are in bloom, and better results are obtained by so doing. Feeding can be done three times a week, but twice is enough if the soil is really rich. One of the liquids recommended in Chapter XIX should be used. It is a mistake to give the liquid in strong doses.

Cutting the Flowers :—There is no need to be afraid of cutting flowers from perennials. With a few exceptions they are benefited by the removal of flowers, and they are generous beings, giving more when the first have been taken. The work should be done in the early morning with a sharp knife, the plants may be damaged if they are "pulled" or "plucked." In the following chapter, and in Chapter XX, I shall mention some of the perennials which are specially useful for cutting.

Removal of Dead Blooms :—Dead flowers should always be removed from the plants, unless seed is to be saved. They weaken the plants and also look untidy. If the foliage of such plants as *Anchusas*, early sorts of *Chrysanthemum maximum*, *Doronicums*, and *Pyrethrums*, is cut down to the ground at once and well mulched and watered, they will yield a second crop of bloom later on, in

the autumn, and this crop is most useful. A bed of *Anchusa* plants covered with bloom on September 27th, is a novelty but it is possible. I have seen it done by merely carrying out these last directions.

Pests of Perennials :—The great enemies of perennials in the early spring are slugs, and in the summer earwigs and aphides. Slugs can be kept off by making lines of soot or lime round such choice plants as *Pyrethrums*, and dusting soot over the others. Earwigs can be trapped in either of the ways described in Chapter XVII. Aphides may be removed by syringing the plants with soft soap dissolved in water.

The secret of success is good cultivation of the ground. Perennials are not as a rule prone to disease. I have had a big border for years without a trace of disease in it so far. This is only because the plants are treated well, so that they grow strong enough to resist attack. Good cultivation pays. The soil must be made good and rich for most of them. But give them good rich soil and plenty of water, and you will not usually be troubled with disease.

CHAPTER VII.

SOME POPULAR PERENNIALS.

THE number of perennials suitable for gardens is so great that it is impossible for me to do more than touch on some of what I consider the best sorts, and those of my readers who think well of others must be indulgent, and remember what a vast subject it is.

Everyone should read carefully the descriptions of perennial plants in the catalogues of good nurserymen. There the newest and latest sorts are set forth, as well as older favourites, and the information will be found reliable and helpful.

No excuse is offered for not including alpine plants in this chapter, for although many of them are useful in the perennial border their place is in the rock-garden.

In choosing subjects special note should be made of height, colour, and period of blooming, as these are the essential characters to be considered in planting.

Achillea :—A fine hardy perennial, and the flowers most useful for cutting. Plant in a sunny position in good rich soil in November or March. Stake early. Water well in the summer months. In the summer the plants are covered with bloom. Propagate by seeds sown in the summer, or by division of the roots.

Good Variety.

Achillea

Ptarmica, The Pearl (Double White), June—

Oct. 2-3 ft.

Aconitum (*Monkshood*) :—A very strong growing perennial suitable for town gardens. It throws up splendid

spikes of bloom, and these are useful for cutting. Plant in good soil in sun or light shade in November or March. Remove dead spikes at once to prolong the flowering. Propagate by seed, or by division of the root-stock.

Good Varieties.

Aconitum

aureum (yellow), June-July 3 ft.

Fischeri (pale blue), Sept.-Oct. 2-3 ft.

Napellus, Sparkes Var. (dark blue),
June-July 5-6 ft.

Wilsoni (blue), Aug., Sept.-Oct. .. 5-6 ft.

Anchusa :—Every garden should contain this. It succeeds in any rich deeply worked soil, requires plenty of water, and may be planted in full sun or light shade. The plants are covered with intense blue flowers in the summer, and if cut down bloom again in the autumn. It is easily raised from seed sown in the spring or summer, also by division of the roots in November, or in July and August. If division is carried out in the summer the plants should be well watered for some time afterwards. Sprays are useful for cutting, but they do not last very long.

Good Varieties.

Anchusa

Italica Dropmore var. (bright blue), June 3-5 ft.

Opal (light "sky" blue), June-July .. 3-4 ft.

Anemones :—Anemones are numerous and beautiful. They succeed well in town gardens, especially *A. Japonica*, and so long as they have good soil they are quite happy. Plant in November or March, give *A. pulsatilla* a chalky soil if possible. Propagate by seeds or division of the roots. *A. Japonica* is useful for cutting.

Good Varieties.

Anemone

Japonica alba (white), Sept.-Oct. .. 2-3 ft.

Japonica rosea (rose-pink), Sept.-Oct. .. 2-3 ft.

pulsatilla (blue, purple), April 1 ft.

Aquilegia :—This is the old columbine under its botanical name. It succeeds well in a half-shady position in any

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ordinary garden soil. Plant in October or March, the latter if the situation is exposed. Propagate by seeds sown in the summer, or by division of the roots in autumn or spring. Give plenty of water in dry weather.

Good Varieties.

Aquilegia

chrysantha (yellow), June-July	..	2-3 ft.
cœrulea (blue and white), June	..	1½ ft.
glandulosa (blue and white), June	..	1-2 ft.
Munstead White (white), June-July	..	2-3 ft.

Aster (*Michaelmas Daisies*):—The perennial Asters form a very large group of hardy plants, well known under the name of Michaelmas Daisies; a name which is now inappropriate, for the hybridist has given us varieties which flower in July. Nearly all are most useful for cutting, being covered with bloom. Perennial Asters succeed well in town gardens in any good soil. Plant in sun or partial shade in November or March, at which seasons they may also be propagated by divisions.

Good Varieties.

Aster

acris (blue), August	..	..	2 ft.
amellus (purple), August	..	..	2-3 ft.
cordifolius (blue, mauve), July-Sept.	..	..	2-4 ft.
diffusus (white), October	..	..	3 ft.
ericoides (white), Sept.-Oct.	..	..	3 ft.
lævis (light blue), Sept.-Oct.	..	..	4-5 ft.
Shortii (blue), Sept.	..	..	3-5 ft.
Tradescantia (white), Oct.	..	..	3-5 ft.

For descriptions of many others see trade catalogues.

Campanula:—These are grand border plants, and there are also many dwarf sorts very suitable for the rock-garden. The colours are chiefly blues and white, and the plants will grow and flower freely in any good light soil, in a sunny or half-shady position. They may be used for cutting, and they all flower freely. *Campanula pyramidalis* has been included in the chapter on Biennials for the reasons there stated, so it is not included here.

Good Varieties.

Campanula

alliarœfolia (white), June-July	2 $\frac{7}{8}$ ft.
grandis (blue and white), June-Aug. ..	3 $\frac{1}{2}$ ft.
glomerata acaulis (dark blue, purple), May-Aug.	1 ft.
glomerata dahurica (violet), June-Aug. ..	2 $\frac{1}{2}$ ft.
persicifolia grandiflora (white), June-Sept.	3 ft.
trachelium alba plena (white), July ..	3 ft.
Van Houttei (dark blue), July-Aug. ..	2 ft.

For many other species and named varieties see trade lists.

Centranthus Ruber :—See Valerian.

Chrysanthemum, Early Flowering :—The early-flowering border Chrysanthemums may be treated as hardy perennials, although strictly speaking they are half-hardy.

Procure rooted cuttings in March, and plant them in a frame, or pot them into pots 3-4 ins. in diameter, in good light loamy soil containing plenty of sharp silver sand. Give plenty of air, and harden off thoroughly, planting them out in good rich soil in April or May. Stake early and give plenty of water during the summer, and about once a fortnight go over the plants and tie them up. They will bloom outside in September and October. In November, when they have been cut down by the frost, lift the roots and store them by planting them close together in a cold frame. In the spring they will start to grow. They may then be split up and planted out in the borders again in April, but to my mind it is better to take cuttings in February, and throw the old plants away in March. The cuttings strike very easily in sandy soil in a cold frame, but must be protected in severe weather.

Good Varieties.

Chrysanthemum catalogues are published by many firms during the winter,. The reader is recommended to send for a few lists and make his own choice from these.

Chrysanthemum, Hardy Perennial :—These are quite different from the early-flowering border chrysanthemums

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referred to above. They are true hardy perennials, and may be raised from seed, or propagated by division of the roots. They succeed in any good deep rich soil, are splendid for cutting, and rapidly develop into large clumps. They are also extremely free flowering. They should be planted in November or March, and the situation may either be sunny or in half shade.

Good Varieties (all white).

Chrysanthemum

Maximum, Dr. Hogg, June-Sept.	2 ft.
Maximum, Mrs. C. Lothian Bell, June-Sept.	3 ft.
Maximum, King Edward VII, June-Sept.	2½ ft.
Maximum, Prince Henry, June-Sept.	2 ft.
Maximum, The Speaker, June-Sept.	2-3 ft.
Maximum, Mrs. J. Tersteeg, June-Sept.	3-4 ft.
Uliginosum, Sept.-Oct.	5-6 ft.

Delphinium :—Delphiniums are, perhaps, almost the finest of the hardy perennials. They are noble plants, and the colours are indescribably beautiful. They succeed in any good deep rich soil, and in cold districts should not be planted till March, though the proper time for them is November. They should be planted in a sunny border and staked early, and must have a lot of water in the summer. They may be propagated from seed in the summer, but this requires more patience than most of us have, for it takes at least four years to get really large clumps. It is better to propagate by division of the old roots in spring or autumn.

Good Varieties.

Delphinium

cardinale (scarlet), Aug.	3 ft.
Carmen (blue), Summer	7-8 ft.
elatum (blue), Summer	6 ft.
formosum (blue), June-July	3-4 ft.
nudicaule (orange, scarlet), June-July	1½ ft.

There are also many others. Some are rather expensive,

but all are worth growing. For descriptions and lists of named varieties see catalogues.

Digitalis :—This is our old friend the Foxglove. It is really a biennial, but will often go on for four years or more. It comes up readily from seed sown in the spring or in June in sandy soil, and the plants so raised flower freely the following summer. Any good soil suits it, so long as the position is not too sunny.

Good Varieties.

Digitalis

gloxinia-flowered (various lovely colours),

July-Sept. 3-6 ft.

grandiflora (yellow), Aug. 2-3 ft.

rosea (pink, rose or red), June-July .. 3-4 ft.

Doronicum :—A grand early flowering perennial, very useful in town gardens, in the wild garden, and in the mixed border. Its flowers are splendid for cutting, and it will grow in any good rich soil. Plant in November or March, in a sunny or half-hardy position. Propagate by division of the roots.

Good Varieties.

Doronicum

austriacum (yellow), April-May 3 ft.

Harpur Crewe (yellow), April-June .. 3 ft.

Echinops Ritro :—A tall plant with blue thistle-like heads. It is 3-5 ft. high, and flowers from June-September. Plant in good deep soil in early March.

Erigeron :—This is another easily grown hardy perennial. It thrives and flowers profusely in any good rich soil, and does well in a town garden. It is exceedingly useful for cutting, and should be in everyone's garden.

Good Varieties.

Erigeron

Coulterii (white), June-Aug. 1½ ft.

speciosus superbus (blue, mauve), May-

Oct. 2-3 ft.

For many other excellent sorts see trade lists.

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Gaillardia :—The Gaillardia, though not so easily grown as some perennials, is well worth cultivating, for it flowers profusely, with a beautiful combination of colour and is useful for cutting. The plant may be raised from seed sown in the summer, but the seedlings must be protected in a frame during the winter. It likes a light sandy soil. Do not plant it before March. Lift old plants each winter and store in a frame till March, when they may be replanted. Gaillardias must have plenty of water in really dry weather and should be staked early.

Good Varieties.

Gaillardia

grandiflora (yellow and orange, etc.),

June–Sept. 2–3 ft.

Backhouse's Perennial hybrids (many beautiful colours). Flower most of

the summer 1½ ft.

Galega :—One of the easiest hardy perennials to grow, this is also one of the most showy, for it develops in an incredibly short time into a large bush 4–5 ft. high, and is completely covered with lilac, blue, or white flowers. It will succeed in any good sunny border, but the soil should be made rich, and it must be strongly staked. Propagate by seed sown in July, or by division of the roots in March.

Good Varieties.

Galega

Hartlandii (pale blue and white), July–

Sept. 3–4 ft.

officinalis (lilac, blue), July–Aug. . . 3–5 ft.

officinalis alba (white), July–Aug. . . 3–5 ft.

Geum :—The soil for Geums should be well drained and they do best in a sunny border. Most of them are free flowering, the two varieties mentioned below specially so. They are also highly prized for cutting, for they look graceful in vases. Propagate by division of the roots in the spring, or by sowing seeds in the summer. In cold districts it is well to lift them in November, and plant them in a cold frame, returning them to their places in the borders

in March. They are exceedingly showy plants if placed near the front of the border.

Good Varieties.

Geum

coccineum (scarlet), May-July	..	2-3 ft.
coccineum, Mrs. Bradshaw (brilliant double scarlet), May-July, and after a break, Aug.	.. ..	1½-2 ft.

Helenium :—This is another easy plant to cultivate which I can confidently recommend. It will grow and flower freely in any good soil if given a sunny position. The flowers are splendid for cutting, and the plants bloom with extraordinary freeness. Heleniums may be raised from seed, but it is better to propagate by division of the roots in March.

Good Varieties.

(For many excellent sorts not named here see trade lists.)

Helenium

autumnale Bigelowii (yellow), Aug.- Oct.	.. ..	3-4 ft.
autumnale Superbum (golden yellow), Aug.-Oct.	.. ..	5-6 ft.
Hooperi (orange), July-Sept.	..	2½ ft.
pumilum magnificum (rich yellow), July-Sept.	.. ..	2½ ft.
pumilum Riverton Gem (rich red), Aug.- Oct.	.. ..	3-4 ft.

Hellanthus :—This is the botanical name for the sunflowers, and in the present section on perennial plants only, it would hardly be legitimate to compare them with the annual sunflowers which many like so well. Perennial sunflowers should, however, find a place in almost every garden, for they are showy, and the blooms are most useful for cutting. The only thing against them is their long spreading roots. When once they get started it is difficult to get rid of them, so that they should be planted on the

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borders of shrubberies or near the entrance to the wild garden. They can be propagated by seeds sown in July, but it is better to increase the stock by division of the roots; small pieces of the roots will quickly develop into large plants. Plant in March.

Good Varieties.

(For many splendid varieties not mentioned here see trade lists.)

Helianthus

Bouquet d'or (double yellow), Aug.—

Oct. 5-7 ft.

Japonicus (yellow), Aug.—Oct. 4 ft.

multiflorus (rich yellow), Aug.—Sept. 5-6 ft.

m. Soleil d'or (grand yellow), Aug.—Oct. 4-5 ft.

rigidus Miss Mellish (orange yellow),
Aug.—Oct. 5-6 ft.

sparsifolius (fine yellow), Sept.—Oct. 6-8 ft.

Heuchera :—This perennial is not so well known as it should be, but it is increasing in favour owing to the introduction of numerous named varieties. It will grow easily in most positions, but it enjoys a site near the front of a sunny border. It is propagated in the usual way by seeds or division.

Good Varieties.

Heuchera

brizoides flambeau (pink or rose), June—

Aug. 1½-2 ft.

hybrida rosea (pink), May—Aug. 1½ ft.

sanguinea (crimson), May—Aug. 1½ ft.

and many others.

Inula :—Another easily grown and most useful hardy perennial. Planted in November in good ordinary garden soil, it flowers freely the following summer. But it dislikes late spring planting. It should be given a good position near the front of a sunny border, and does not need a great amount of staking. Propagate by division of the roots in November, or raise seeds in July. Give clumps plenty of water.

Good Varieties.

Inula

glandulosa (golden yellow), July-Aug. .. 2½ ft.

macrocephala (yellow), July-Sept. .. 3 ft.

Lupinus :—*Lupinus Arboreus*, the tree-Lupin, is quite different from the ordinary border varieties. It develops into a huge bush if given a sunny and sheltered position, and this bush is covered from June-September with yellow or white flowers. Tree Lupins do best on very hungry soils. They thrive excellently on the red sand capping the Oxford Clay in Berkshire. They need no care except frequent hoeing and strong staking, and are not thirsty plants. They may be raised from seed ; or they may be propagated by division, which, however, is not at all easy, as may be seen by examining the roots of a plant in the autumn.

The border Lupin, *L. polyphyllus*, is hardier, and while not such a good drought resister as the tree-lupin it is not a particularly thirsty plant. It often grows to 3-5 ft. high, and the spikes themselves are frequently 24 ins. in length. It enjoys a position in a sunny border, and may be planted near shrubberies where it need not be disturbed. It will grow nearly everywhere, and therefore is specially suitable for town gardens. It should not be replanted frequently, and like the tree-lupin it is almost impossible to divide the roots. It is best to raise it from seed sown in May or June, and to discard the old roots when they get too big. Stake securely in mid-May.

Good Varieties.

Lupinus

arboreus Luteus (yellow), June-Sept. 3-5 ft.

arboreus, Snow Queen (white), June-Sept. 4-5 ft.

polyphyllus cœruleus (blue), May-Sept. 2-5 ft.

polyphyllus albus (white), May-Sept. 4 ft.

polyphyllus roseus (pink), May-Aug. 3-4 ft.

Many named sorts to choose from are described in trade lists.

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Lychnis :—The Lychnis is a capital plant for town or country gardens ; it will succeed almost anywhere. Large clumps of the tall variety, *L. Chalcedonica*, form a striking addition to any perennial border. The plant is not particular so long as it has a good rich soil, and many of the dwarf varieties (not included below) are useful in the rock-garden. Plant in November or March, and stake early, giving each good sized clump three or four stakes to avoid bunching. It is best to propagate it by division, but it may also be had from seeds sown in the summer. Plant in sun or partial shade.

Good Varieties.

Lychnis

<i>Chalcedonica</i> (scarlet), June–Aug. ..	3–4 ft.
<i>flos-cuculi alba plena</i> (white), June–July ..	1½ ft.
<i>Haageana</i> (scarlet), June–July ..	1–2 ft.

Ænothera :—This is the perennial Evening Primrose that we are all so fond of, a most useful plant. Give it a position in a sunny border with good sandy soil. Propagate in November or February by division of the roots. Otherwise plant in March.

Good Varieties.

Ænothera

<i>Fraserii</i> (yellow), June–Sept.	1½ ft.
<i>speciosa hybrida</i> (rose, centre white), June–Oct.	1–1½ ft.
<i>Youngii</i> (yellow), June–Sept.	1–2 ft.

Pæony :—Most people imagine that this is one of the most difficult perennials to grow, but it is quite a mistake. The secret is in good deep cultivation. Dig the soil 2–3 ft. deep, and put in plenty of manure. Choose a position that is in partial shade, West or South-West aspects being the best. Plant in October. Pæonies dislike being moved, so plant them where they are to remain. They require careful staking, and should have plenty of water. Spring planting, poor shallow soil, too little shade, and an insufficient amount of water in the summer, account for many failures.

Pæonies average from $1\frac{1}{2}$ – $3\frac{1}{2}$ ft. in height. There is a good range of colour to choose from—pink, purple, rose, crimson, white, or yellow. The double sorts are splendid. The flowering period is from May to July.

Good Varieties.

The number of varieties is so great and the good points of each are so numerous that I must leave it to my reader to refer to some good hardy plant catalogues and make his own choice.

Pansy :—The Pansy has been somewhat neglected of late on account of the introduction of the Viola. But the real large Pansy is infinitely better than some of the violas now on the market. Still there are very definite reasons why the Viola is so popular. The Viola is almost perpetual flowering, it starts in April, and if the dead flowers are cut off it never ceases till October. Moreover, Violas do not become leggy and unmanageable. This cannot be said of Pansies. Pansies cease blooming in the late summer, having by that time become very leggy and ugly. They must then be cut down and well watered to obtain cuttings. (Violas need no such treatment.) Cuttings of Pansies are formed in September and October and may then be inserted in sandy soil in a frame. They will strike readily and can be planted out the following spring. After taking cuttings in the summer, the old plants should be thrown away; on the other hand violas can be replanted and will do another year or probably two.

Pansies and violas may also be easily raised from seed. Sow in shallow pans in June. Prick off when large enough, and in cold districts lift the seedlings in October to winter in a cold frame, planting out permanently in the following March. Otherwise transfer in October to their flowering quarters in well cultivated soil.

Good Varieties.

No selection of varieties of Pansies and Violas can be given because named sorts are so numerous and so good. Many firms specialise in these plants, so the reader should send for lists and make his own choice. All pansies and

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violas are useful for planting as edgings to the perennial border.

Papaver :—This is the perennial poppy of which there are so many lovely named varieties. They are not at all difficult to grow, requiring only a good rich soil in a sunny or half-shady border. Some of the flowers are huge and the plants are noble ones for any border. They are propagated by division of the roots or from seed, but this needs patience. They flower from May–October, and should have plenty of water. Plant in October or February.

Good Varieties.

Papaver

orientale, many named varieties for which see trade lists (crimsons and scarlets), May–July	2–4 ft.
nudicaule (yellow, orange, white), May– Oct.	1 ft.

Pentstemon :—Many gardeners do not grow Pentstemons at all, others only grow some insignificant variety, and treat this as a biennial. But this is a mistake. The plant must either be grown as a half-hardy or as a hardy perennial. Its culture as a half-hardy annual is as given in Chapter III. To grow it as a perennial, however, sow seed in June, and prick off into beds of good soil when large enough. Winter the plants in a frame and plant out in March. After they have bloomed cut down and mulch if they have not been mulched already. In cold districts lift the roots and winter in a frame, planting out again each season in the following March. If the district is not a cold one, leave them in the ground, and cover the crowns with leaves and ashes in November, removing this in the following March. Pentstemons include some of the most beautiful of our garden flowers, and should be grown by everyone.

Good Varieties.

Pentstemon

barbatus (scarlet), July–Aug.	2–3 ft.
b. cœruleus (blue), June–July	1 ft.
Newbury Gem (scarlet), all the summer	1½ ft.

Southgate Gem (crimson, scarlet), all the
summer 1-1½ ft.

Scarlet Gem (bright scarlet), all the
summer 3 ft.

Many other magnificent sorts are offered in plant catalogues.

Phlox :—Certainly some of the finest hardy perennials. Of late years many wonderful varieties have been obtained by the skill and patience of the hybridist, and these varieties include some most strikingly beautiful colours. They are quite easy to grow. The soil should be rich and deep, but light soils must be well strengthened. Plant in October or March, in either sun or light shade, and mulch in April with decayed horse dung. Water frequently throughout the summer for they are thirsty subjects, and stake securely in good time. Divide and replant once in three years in October or March.

Good Varieties.

Phlox

decussata (many beautiful colours and named varieties), July-Oct. ..	2-4 ft.
paniculata (lilac white), Aug.-Sept. ..	4-5 ft.
suffruticosa (many grand colours), June- July	2-2½ ft.

Polemonium :—A very beautiful and easily grown hardy perennial. It does not need much staking, and will grow in any good moist soil in sun or light shade. It flowers very freely, and is in great demand for cut bloom. Propagate by division of the roots. Plant in November or March.

Good Varieties.

Polemonium

cœruleum album (white), summer ..	1½-2 ft.
cœruleum Richardsoni (blue), June- Aug.	2 ft.
cœruleum variegatum (blue), June- Aug.	1½ ft.

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Potentilla :—These are grand perennials. Plant in November or March in good, deep, rich sandy soil, and water well in dry weather. They should be mulched in April with decayed manure and fed with liquid manure when in bloom. Propagate by division of the roots in March, or by seed sown in a frame in June.

Good Varieties.

Potentilla

atrosanguinea, single (crimson), June–
 Sept. 1 ft.
 Hybrida, double (red, yellow, orange),
 July 2 ft.

Many excellent named sorts, for which see catalogues.

Pyrethrum :—As hardy border flowers, Pyrethrums take a high place. Their glorious colours, mostly reds and pinks, make them very showy, and the flowers are highly prized for cutting. Most of them are extremely easy to cultivate, a good rich soil in a sunny border suiting them excellently. Their great enemy is the slug, but he may be kept in check in one of the ways given in a later chapter. In cold districts do not plant till March, elsewhere in November. In exposed places lift and winter in a frame, planting out in March. Propagate by division. To divide plants do not chop the clump in two with a spade, but use an old carving knife. Divide in February or March, not April as some advise, or only poor flowers will grow that season.

Good Varieties.

Pyrethrum

coccineum, double (many shades of red,
 pink, also white). Named sorts
 numerous. May–June ; Aug.–Sept. $1\frac{1}{2}$ – $2\frac{1}{2}$ ft.
 coccineum, single. Many grand sorts
 (reds, crimsons, pinks, and white)
 described in lists. May–June ;
 Aug.–Sept. $1\frac{1}{2}$ – $3\frac{1}{2}$ ft.

Ranunculus :—Another most beautiful and easily grown perennial. It will thrive well in any good rich soil, and

enjoys a shady border. Propagate by division in March, and plant in March or November. Mulch in April.

Good Varieties.

Ranunculus

aconitifolius fl. pl. (white), May-July .. $1\frac{1}{2}$ ft.

acris fl. pl. (yellow), May-June $2\frac{1}{2}$ ft.

For other excellent sorts see hardy plant catalogues.

Rudbeckia :—Will grow in nearly any soil, and thrives well in a sunny border. To give it a start the ground should be made rich, and then it can be left to itself for three years. It must, however, be staked, and the flowers should be freely cut. They last splendidly in water. Propagate by means of seeds, or division of the roots. Plant in November or March.

Good Varieties.

Rudbeckia

laciniata fl. pl., Golden Glow (yellow),

July-Aug. 5-6 ft.

Newmanii (yellow), July-Sept. 3 ft.

Several other beautiful sorts described in trade lists.

Scabiosa :—This is the perennial scabious, and it succeeds anywhere so long as it is given a light warm soil and plenty of sun and air. The flowers are useful for cutting and are produced from June to August. Plant in March. In cold districts it must be lifted in November and wintered in a frame, planting out early in the following March. Propagate in the usual way from seed, or division of the roots.

Good Variety.

Scabiosa caucasica (blue, also white). June-

Aug. $2-2\frac{1}{2}$ ft.

Solidago :—The botanical name for the well-known Golden Rod, that tall perennial that we are all fond of, with its showy yellow bloom. It should be placed at the back of the perennial border, and if possible given a semi-shady position. Propagate by division. Plant November-March.

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Good Varieties.

Solidago

serotina (yellow), Sept.-Oct. 5 ft.

Shortii (yellow), Aug.-Oct. 5 ft.

Sedum spectabile :—An extremely useful autumn-blooming hardy perennial. Its large heads of pink form a striking bit of bright colour near the ground in the often sombre autumn borders. It is also a rock plant. It enjoys good rich soil, and soon develops into large clumps. Propagate by division, or by "root cuttings" in the spring. Plant November or March. It only grows 1 ft. high, but should be in every border.

Trollius :—Little need be said about the Trollius or Globe Flower, except that it will succeed in any good rich moist soil, if the position be one of semi-shade. The flowers are prized for cutting, and come in profusion. The plant frequently flowers a second time, in September or October. Propagate by division of the roots in November. Plant in November or February.

Good Varieties.

Trollius

asiaticus (orange), May-June 2 ft.

europæus (orange yellow), May-July .. 1½ ft.

Valerian :—This is everybody's perennial. Merely plant it in good soil in October or March in a sunny border, and leave it to do the rest. It will soon reach a height of 2-3 ft., and be covered with bloom all the summer. The more you cut the more you get. My own plants never cease blooming from June to October. There are scarlet, red, and white varieties, but the scarlet is much the best. The Valerian spreads rapidly, so must not be put near choice things. Propagate by division in November. Remove dead spikes of bloom or it will seed itself all over the ground.

Verbascum :—The popular name for this plant is Mullein. The plants, which are not to every one's taste, are to my mind some of the noblest of hardy flowers, and the colours of the many named varieties are wonderful. Although included here as hardy perennials, *Verbascums*

are strictly biennials. They are best raised from seed sown early in the year, and if they are specially strong they will flower themselves to death the following summer. But it more often happens that they only do moderately well in the second summer, but in the third year throw up one main and several small spikes of bloom, and then kill themselves with blooming. Seed ripens and is thrown on to the border if the spikes are not removed, giving rise to plenty of seedlings. Plant in November or March, preferably the former, and support with strong stakes in summer if the garden is exposed. Also keep the plants well supplied with water.

Good Varieties.

Verbascum

Olympicum (yellow), June-Aug. .. 6-8 ft.

Phlomoides (yellow), June-Aug. .. 5-6 ft.

For descriptions of the many named varieties see Hardy Plant Catalogues.

Veronica :—One of the very best of hardy plants. Yet for some reason it is not often grown. It thrives in any moist ordinary garden soil, and is covered with bloom in the late summer. It is propagated readily by division of the roots in November or March, and may also be raised from seed. When established it spreads rapidly, especially *V. spicata alba*, and does well in a moist sunny border in a town garden. Plant in March.

Good Varieties.

Veronica

longifolia (blue), July-Aug. .. 3 ft.

spicata (blue), July-Aug. .. 1½ ft.

spicata alba (white), July-Aug. .. 1½ ft.

subsessilis (violet blue), Aug. .. 2 ft.

Viola, Border Variety :—This has been dealt with in the notes on Pansy (page 63).

Viola cornuta :—This is quite different from the Border Variety, and it may be treated in the usual way for hardy perennials. It is most useful as a covering plant; once started it grows rapidly, and soon covers the ground with

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its foliage and its blue and purple flowers. From May to September the plants make a sheet of lovely colour. *Viola cornuta* is neglected by many people for the border variety, but I confidently recommend it. Plant from October to March in good moist soil in a sunny or half-shady position. Lift, divide, and replant every two or three years.

Good Variety.

Viola cornuta atropurpurea (blue and purple),

May-Sept. 6 ins.

CHAPTER VIII.

COLOUR BORDERS.

The Question of Colour :—A tour round our neighbours' gardens will almost certainly leave on us very mixed impressions. Some gardens will have pleased us, others the reverse. Faults of laying out and planning may be there, but are not so striking. It is the colour which is all important. Colour effects imprint themselves on our minds, and where we find it hard to decide "what is the matter with so-and-so's border," it is almost certain to be the colour. Colour in the flower garden is everything. It is absurd to imagine that any border can be sown or planted to yield a beautiful effect without very careful thought on the question of colour. Yet I come across people who imagine they can do this. People have told me that when planting a new perennial border or sowing a border with annuals "they never worry themselves about the colours." Some say that the idea of colours clashing is "popular nonsense."

I well remember one perennial border some 6-9 ft. wide, and 40 ft. long, which I was invited to see when in full bloom. It was indeed a sight, a heart-rending one. Almost every colour clashed, there were no soft tones at all, all was a mass of glaring, clashing colours.

Experiment with Colour :—Many people are not sensitive to clashing colours, but then they should cultivate an eye for colour. Really beautiful borders cannot be obtained without an eye for colour; if the colours clash, the first and fundamental rule of colour gardening is violated.

A useful exercise is to obtain small strips of coloured material and put them each in turn side by side. The reader is advised to do this with the following colours:—Crimson, Orange-Yellow, Violet, Red, Yellow, Blue, Magenta, Scarlet, Ultramarine Blue, Dark Green, and Purple. Study them carefully by daylight.

A box of cheap paints and a piece of drawing paper may provide another very useful exercise. Let us suppose we wish to arrange the colours of the plants in a narrow border as follows:—First four feet—red plants; second four feet—violet; third four feet—golden yellow, and others to the end of the border. Paint blotches of those colours on the drawing paper. First red; then violet; then golden yellow, and so on. This will give a picture of what the colour scheme of the border will look like, and should show which colours blend naturally and which do not. It is a practical exercise; do it if possible, making careful observations, and it will be of service both in following the suggestions in this chapter and in arranging the plans for a border. It may seem to have little to do with gardening, but it is a good method of training.

The Width of the Border:—Gardeners are generally agreed that the larger the area the easier it is to make a first-rate colour scheme. But of course this depends partly on the size of the plants used. A pretty colour border is obtainable with dwarf compact annuals on an area not more than 4–5 ft. wide. With perennials the width must be increased unless the very small kinds alone are used. A border 6–7 ft. wide is quite workable, but 10–12 ft. is not too much. The length does not matter so much, but it should be as great as possible.

The "Patch" System:—On narrow borders it is best to divide the ground into patches running right across the width. Each patch, say 4 ft. wide and 5 or 6 ft. long, should be devoted to one colour, and the colours of the patches next to it must harmonise.

In wide borders, however, such as those 10–12 ft. wide, the whole width of the border should not be taken up with

one single colour. Half the width may well be of one colour, but the rest should be different. But all the colours should be arranged to harmonise with those of their most intimate neighbours. When the beginner becomes more experienced he can arrange irregular patches of colour, but it is best to begin with simple regular ones.

Thus the whole border will be divided into patches ; and in order that there may be no mistake, it is well to draw a rough plan, first writing or painting in the colours of each patch and then carefully selecting the plants to correspond. For this the descriptions in the preceding chapters will be found useful. In the case of perennials it is best to rely chiefly on those which have a long blooming period, otherwise some patches may be devoid of bloom in the height of summer. Of course, if the patches are large, a variety of plants may be included, but each patch should contain at least two plants which bloom for a long period. The idea should be to have a plant representing each colour blooming in the border for six or nine months. Otherwise there will be gaps of nothing but green, and the colour border is easily spoilt by one or two of these gaps. This can only be avoided by a judicious choice of subjects.

The Height of the Plants :—In Chapter VI I said a few words on the question of the height of perennials, and in Chapter III of annuals. It is quite possible to have a beautiful colour border if the plants are arranged strictly according to their heights, but it is possible to get a far more beautiful effect if the plants are more skilfully arranged. A beautiful colour border which I saw in the South of England not long ago was so arranged that tall plants stood boldly out in places quite near the front, whereas in other parts there would be " valleys " of dwarf plants running almost to the back of the border. This arrangement is more fascinating and more natural than a " graded " border. In Chapter VII the height, colour, and blooming period of most of the popular perennials are given, for use in the planting of a colour border.

The Use of White :—A word must be said on the import-

ance of white. A border may be a big one and the choice of colour not very great. In these circumstances two colours which would clash if side by side can be separated by a patch of white or cream flowers. Any colour can stand beside white without marring the picture. Where there is difficulty about two colours, separate them with white, is a safe rule.

Colours which Clash :—My reader will do well to return again to colour painting or coloured materials and discover by actual experiment which colours agree and which do not. Try red with violet; violet with golden yellow. Look well at these colours, surely red and violet clash, but violet and yellow harmonise. Here is a table of colours which do not harmonise, which I hope will be useful to my readers :—

Crimson clashes with Deep Blue.

Red	„	„	Violet.
Blue	„	„	Magenta.
Magenta	„	„	Orange.
Yellow	„	„	Scarlet or Sky Blue.
Purple	„	„	Scarlet or Sky Blue.
White	„	„	Nothing.

Colours which Harmonise :—If my reader avoids putting blue by the side of magenta, red against violet, etc., he will at least have avoided some of the worst mistakes in colour schemes. But it is, of course, important to get the colours in the right sequence. For this purpose much may be learned from a little paint-mixing. By this means it will be found that yellow becomes orange by being mixed with red; red becomes purple by being mixed with blue; and so on. Yellow and orange do not clash, nor do orange and red, nor do purple and red. But golden yellow does clash with red, and violet with red, perhaps because there is more yellow and blue in these than there is in orange and purple. In other words, when a compounded colour contains more of one colour than another, it tends to clash with the colour which is present in the lowest proportion.

I shall never forget a wonderful colour border I once saw

in Wales. The herbaceous garden was extensive and, as the gardener said, "was planted solely for colour effect." I stood at one end and looking right down the border I could not help giving a gasp of pleasure. The border began with white, then colours appeared in the following order: Light Pink, Rose, Crimson, Scarlet, Bright Orange, Yellow, Lilac, Purple, Violet, Intense Blue, Sky Blue, and the palest Yellow. I remarked to the gardener that it was far and away the best colour border I had seen, and that it must have taken some thought to plan it. "You are right there, sir," he replied. "I could hardly have done it alone, for colours are not easy things to make agree. But an artist came down from London to stay at the Mansion, and he seemed to know just what would go together. He was up in colours, and could tell me all about them."

My readers who have a desire to plant a big colour border should try the arrangement given above. I do not think they will be disappointed.

Single-Colour Borders :—These are becoming very popular in large gardens. Instead of a border containing many colours arranged in harmony, a single colour is assigned to each border. Thus one border may be devoted entirely to blue, another to yellow, another to red flowers and so on. Borders should usually be small where this plan is adopted, for of necessity there are not great quantities of plants with flowers of a uniform colour to choose from. There are, of course, numerous shades of all colours, but that is not quite what is wanted. It is better to have small borders and keep strictly to one distinct shade of colour in each, than to arrange larger borders containing three or four shades.

CHAPTER IX.

SUMMER BEDDING SUGGESTIONS.

THE question of summer bedding is a vexed one, on which I claim to hold my own views. In parks and big gardens in most parts of the country we see much rigid summer bedding. Is summer bedding necessary? Many people would say emphatically "yes," but my own reply would be a "no." It is certainly not necessary in the gardens of amateurs, yet how often one sees it.

Summer bedding in small gardens is undesirable for the reason that so much more beauty can be got without it. I refer to the old summer bedding of geraniums, and lobelia, and stocks, asters, and alyssum. The beds are pretty enough in themselves, but they are there merely for show, there is little or no utility in them. The amateur who goes in for summer bedding will not have his flowers cut for the house. That would spoil the effect, he says, and so the plants are left there purely for show. Considering the utility and beauty of herbaceous plants, or of the new bedding which I shall refer to presently, these old bedding plants may well be done away with, and with them the rigid principles of old summer bedding.

I make a plea for the total abandonment of the old stiff, ornate, summer bedding, and in this chapter on Summer Bedding Suggestions I deal with the new kind of bedding, which is far more beautiful, more natural and effective as well as useful than stiff rows of geraniums, stocks, etc.

The New Summer Bedding:—The secret of the new summer bedding is in its originality. The general idea is to make the "front" beds of the garden more like the

herbaceous borders. Originality in the plants, in the grouping of the plants, and in the colour effect is required. In the new bedding many half-hardy annuals are used. These are planted in association with hardy annuals, and indeed also with some perennials. Chapter IV refers to many annuals which are extremely useful for this purpose. The list of half-hardy annuals at the end of Chapter III also indicates the great variety of plants which there is to choose from. These plants are all beautiful, and some of the half-hardy annuals are entrancingly lovely. There are full descriptions of many of them in good seed catalogues.

The new sort of bedding is indeed worth trying, and nurserymen are encouraging it by supplying good plants of a large number of annuals at the end of May.

If it is necessary to raise the stock oneself, it involves a little more trouble than with Geraniums, etc. The seed of some half-hardy annuals does not germinate very well, and the young plants are liable to damp off after being pricked out unless care be taken. But then gardening is dull if it is easy. There is pleasure to be gained in experience, and added beauty for the borders.

Originality of Arrangement :—The arrangement of plants in their summer beds should be original, on a well-thought out scheme. Avoid straight lines and geometrical figures. The borders themselves may be geometrically shaped, but the planting arrangement should be simple and natural, and not geometrical. Consider, for instance, a long border in which the so-called carpet bedding has been laid down in accurate triangles of different colours, edged top and bottom with some small white or pink plant ; or a circular bed divided into smaller circles, each planted with some neat dwarf growing plant of a separate colour. One may be struck with the skill of the gardener or admire the grouping of the colours, but after all, such borders may look ornate but quite unnatural.

Nature did not intend plants to be arranged thus. In the country you never find plants growing in triangles, squares, and circles, but in irregular patches ; and if a

border is to look natural it must be full of bewitching irregularities, but without being a "muddle" border.

I have written much on originality, and have been much criticized. But one day I ran across an amateur who did not know me. We got chatting about gardening, and he said he had planted a border in accordance with the new summer bedding. "A chap wrote an article for one of the gardening papers some weeks back," he said, "on the subject."

"And what did you think of it?" I asked casually.

"Well," he replied, "until I tried it I was doubtful. But I got *Antirrhinums*, *Brachycome*, *Calliopsis*, *Chrysanthemum segetum*, *Dimorphotheca*, *Helichrysum*, *Mimulus*, *Nemesia*, *Phlox Drummondii*, *Petunia*, *Verbena*, and *Zinnia*, and of hardy annuals which the fellow recommended I chose *Calendula*, *Godetia*, *Saponaria*, *Silene*, and *Sunflower*. I took the article into my garden with me, and set the plants in rough irregular patches just as the man had said. I avoided clashing colours, and put colours of a similar shade side by side. The tall plants such as *Antirrhinums*, *Helichrysums*, and *Petunias* were generally put towards the back and so were *Godetias*, *Calendulas*, and *Sunflowers*. But as I was told that there was no need to be over particular about the height I set some of them near the front. That border was a sight when I left it a day or two ago to come down here on business. I shall never go back to the old now that I've tried the new."

It was evident that he had seen my article and acted on it although I did not tell him so. And if he sees this, as he probably may, I hope he will accept my grateful thanks for his kind appreciation.

To sum up the main points. The argument has been to avoid the old-fashioned geraniums, stocks, asters, lobelia, etc.; and to avoid the old-fashioned arrangement of plants in straight lines, circles, triangles, or other geometrical figures. What I would encourage is the planting of newer and more beautiful plants in a natural and irregular manner, so that the colours of the flowers and the plants themselves how off to the best possible advantage.

CHAPTER X.

HOW TO MAKE A SMALL ROCK-GARDEN.

UNTIL a few years ago rock-gardening was considered too complex and expensive a pastime for the average amateur gardener, and was left to those who possessed large gardens and had deep pockets. But this is now changed ; rock-gardening is " the fashion."

The reason is simple enough ; people have discovered the intense fascination of a rock-garden. They have found out how many bewitchingly beautiful little plants may be grown even on quite a small area of ground, even in their own back-yard, and that the little treasures they admired abroad can be grown to love and cherish at home. There is world interest in a rock-garden, there is excitement, there is tragedy, there is success ; in fact, there is everything one can desire, on a small scale. And the excitement is no small part of the joy of rock-gardening. There is an element of chance in it. It is a triumph for the amateur to be able to say that he got *Saxifraga Apple Blossom* in bloom on February 16th, when perhaps his friend's plants were not out till March 9th.

There is another thing which makes this branch of gardening so fascinating ; namely, the humouring of the little plants themselves. Rock-plants are like young children, they respond to love and care. And love and care must be amply bestowed on them to induce some of the shyer plants to thrive and flower. Every true gardener loves his plants ; it pains him to see them in distress, and it is a

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general maxim that the more true love and care bestowed on them the more will they thrive.

It will not be possible to go into the subject here so fully as it deserves. I must leave moraine gardening, wall gardening, bog gardening, and water-gardening, which are all closely allied to rock-gardening, for the present.

The Site of the Rock-Garden :—A natural bank, not too steep, in a sunny position, is quite a capital spot for a rock-garden. In the suburban garden a sunny corner between two walls will do. The position should not be in the shade of either buildings or trees, for a free access of sunshine is necessary for most rock-plants. The drip of trees is extremely injurious to any but the commonest, moreover, the roots of the trees may come up into the soil of the rock-garden and spoil it.

The position should be an open one, with free access of air, rain, and sunshine.

The general character of the rock-garden must depend largely on the site. A rock-garden in a corner between two walls is generally merely a raised mound of earth and stones, quite simple, yet pretty. A rock-garden made in a long narrow border is generally a continuous ridge, or a series of ridges and dips. A rock-garden made of a natural bank will be more or less crag and slope; a path may be run midway up the bank and then there will be crags above and slope below. But if there is a flat piece of ground for the site it is better still, although more work will be needed to obtain the desired result. Making a rock-garden on a large flat piece of ground is more wonderfully interesting than any other form of the work, for it is in this that the individuality of the gardener can be shown to the best advantage. On a bank one is naturally hampered by the general lie of the ground but if the ground is flat, there are endless possibilities.

The Stone to Use :—Geologists tell us that in no other country in Europe is there such a large variety of rocks as in England. And this seems true if one goes about a little and taps off bits of rock in quarries and stone pits as I have

done. Some stones are hard, some soft ; some weather readily, some take years to weather ; some break clean into blocks or flags, and some only break into very rough unshapely pieces.

Some rocks contain many fossils ; these are interesting to the collector, but they look odd and unnatural in a garden. I once tried making a rock-garden with stones full of visible fossils, but did not at all like its appearance. Use unfossiliferous stones if possible, or arrange the stones so that the fossils do not appear.

As a general rule hard stone should be used, but not too hard. Granite, Whinstone, Dolerite, Diorite, Slate, Basalt, Gabbro, Trachyte, Felsite, Greenstone, and similar rocks are not suitable for rock-garden construction, although plants will be found growing fairly freely about some of them in nature. Also such crystalline rocks as Marble, Derbyshire Spar (Calcite), Gypsum, and Heavy Spar, look unnatural.

But over and above these there are still a good many rocks to choose from. Some of these I give below :—

Sandstone :—There are many sorts of this. Those found in our own district, in the coal measures, are eminently suitable for rock-garden making, but other kinds will do. Avoid using red sandstone on account of the iron it contains, millstone grit as being so extremely porous, conglomerate and breccia for their unsightly appearance, and inferior calcareous sandstone on account of the rapidity with which it disintegrates.

Shale :—Sometimes shale is quite hard enough and found thick enough to be used for rock-gardens. So long as it is brown and fairly sandy it is quite useful ; but black shale or red shale should on no account be used. Rough pieces of *Gannister* may also be used, if nothing better is available.

Limestone :—There are many kinds of this, but the hard Derbyshire Limestone is, to my mind, the best. It is found in many other parts of England, and where it is quarried it is usually fairly cheap. Silurian Limestone, " Wenlock "

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Limestone, as it is called, is also good, but usually teeming with fossils. Devonshire Limestone is quite good, Cretaceous Limestone (Chalk, etc.), is fair, and Tertiary Limestone is fair.

Jurassic Limestones must only be considered fair for rock-garden making. Some of the oolites (Upper Jurassic), are quite valuable for the purpose, but not nearly as valuable as people sometimes make out. Many of the oolites are too brashy, too fossiliferous, and too easily disintegrated. The stone from the series known as "The Portland Beds" is the best. If, on the other hand, other oolites have to be used, the hardest, closest-grained samples should be chosen. Beds of hard oolite are generally found at the base of every rubbly stone. This is also the case to some extent with the Tertiary Limestones, such as the stones known as "Craggs." If these have to be used, always obtain the hardest samples. On the other hand Limestones which are very crystalline, as the Derbyshire Limestone sometimes is, should not be used.

Tufa :—This is quite fairly good if obtainable. But in my view does not look very natural. Holes may be made in it, or through it, and filled with soil, and the plants set in them. They thrive quite well.

Artificial Stone :—Burnt clay, burrs, and slag have been used in some districts where stone is scarce, but the practice cannot be recommended. Those who have seen rock-gardens made of this class of material will know how ugly it looks, and plants seldom thrive there. Allied to these is the manufactured rock-garden stone. This is usually made into rough irregular pieces. It consists of a mixture of stone, sand, and cement. It may have a more or less natural appearance, but I would far rather do without it if possible. Of course if there is nothing better available, it must be pressed into service, but it is a good rule to use the very smallest quantity possible. If I were in a county where stone is scarce I would rather use artificial concrete rocks than such awkward materials as burnt clay, burrs, or slag.

To sum up then, good hard uncrystalline limestone, or hard close-grained sandstone are the best.

The size of the stones is a vexed question. Some rock-gardeners tell us that the larger they are the better. My own view is that the size of the stones should be in proportion to the size of the rock-garden. It is to my mind absurd to make up a small rock-garden of blocks weighing 2 or 3 cwt., or a large rock-garden of stones not weighing more than 7 or 14 lbs. In a small rock-garden, stones of various sizes should be used, with a range of 5 × 6 ins. up to 18 × 24, or even perhaps a little more. The smallest will weigh only a few pounds each, and even the largest will be fairly easy to lift. The depth of the stones should vary, perhaps from 3-12 ins. is a sufficient margin.

The stones should be irregular in size and shape, and preferably should not have been "dressed" in any way. There is something too much like building a house in using neatly dressed stone blocks for rock-garden making. It is difficult to arrange them to look natural.

Many blocks of limestone and sandstone show the lines of bedding more or less clearly. These should be obtained if possible. On the other hand avoid stones which show "false bedding," two or three groups of lines of bedding crossing or joining each other; they generally weather badly and look ugly.

The Soil :—Too little attention is frequently paid to the soil. "Anything will do" is the popular idea, but nothing is further from the truth. The soil is a most important factor, and a mistake may spoil the whole collection of rock plants.

Clay soil is, generally speaking, the worst, but the use of it must not be absolutely forbidden on account of its readiness to become caked and hard. In the perennial border it is customary to lighten the clay in one of the manners described in Chapter XXIV, but the soil for rock-gardening cannot be lightened in this way, because it is usually impossible to obtain an intimate enough mixture of the various ingredients.

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Sandy soil, in fact any very poor hungry soil is also unsuitable. Few rock-plants will thrive in it.

Opinions differ, but I am convinced that the best soil is good meadow loam. If this cannot be had, use rich garden soil mixed with equal parts of leaf mould and plenty of sharp silver sand. But meadow loam is the best. Builders often want to sell turf, but do not think the soil just below it so valuable. This meadow loam, however, is what we need. When it arrives turn it over on to quite a fresh piece of ground. Break up any big lumps, and pick out every bit of weed root that is seen; this is most important. If the pasture was good there should not be much to pick out, but it is important to remove all, for every bit will grow, and if introduced into the rock-garden it is hard to get it out again. Also keep a sharp look out for wire-worms and other soil pests, removing and destroying them as recommended in Chapter XVII on Garden Weeds and Plant Pests.

Arrangement of the Soil :—If the site is a flat piece of ground, the first thing to do is to make a rough plan of the proposed garden, showing the main path (which should be at least 3 ft. wide) and other principal features; and having then marked out the ground, to wheel on the soil, shooting it up into hillocks. It is an excellent idea to make two main series of hillocks, letting them run roughly North and South, with a winding path between them. Shrubs can be planted on the East to protect the plants from cold winds.

The hillocks should vary in size and steepness but the height of a hillock when it has settled should not exceed two-thirds of the width from the path to the centre of the mound. For instance, if the greatest width of the hillock be 12 ft., the width from the path to the centre of the mound or hillock will be 6 ft., and the height of the hillock when it has settled should not be more than 4 ft. The hillocks will be separated irregularly from each other by "valleys" through which little paths may meander, all joining the centre path. Such an arrangement will give a variety of

aspects for the plants, and if skilfully planned, every possible aspect.

If the rock-garden is to be merely a corner, then one mound will do, which should not be too steep. If a bank is to be made into a rock-garden, then the poor soil of the bank should be covered with at least a foot of good soil ; but this is not always possible until some of the stones are placed. And if a long narrow border is the site, put on at least a foot of good new soil, but do not make the ridge or ridges very steep.

A large quantity of soil must be retained for use during the building, and the builder is recommended to cut his finger nails close before beginning the work. Finger nails can get badly broken during rock-garden building, a fact learned by sad experience.

Arrangement of the Stones :—First of all let me take the reader to a sandstone or limestone quarry. A careful look at the rocks will show that they lie in more or less horizontal layers ; they are rarely much tilted up, and are hardly ever seen standing point upwards. If it be a disused limestone quarry it will be noticed that rock-plants do not thrive under overhanging rocks. They must be on the top with free access to rain, sun, and air.

Now let us return to our garden. Let us have a good look at the mounds of earth and satisfy ourselves that they are in good positions.

Then take a large stone from the stone heap and place it at the bottom and end of a mound, in such a way that it imitates the lie of a piece of rock in the quarry. It may be absolutely horizontal, or dip slightly one way or the other. The stone should be let well into the mound so that it holds up a quantity of earth which would otherwise fall away. Large stones may be let in one-half their depth or more, and their base should be sunk into the ground at least 4 ins.

Repeat the process with another stone, which should be of a similar size and placed in a similar way, end-on to the first stone at the base of the mound. This one may lie

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tilted, a little more steeply than the first and should be placed a little higher. It must be well let into the mound. Continue this process along the foot of the mound till the corner is reached where, if the quarry is to be imitated, the rock should crop out. This is managed by choosing a stone with two good faces at right angles to each other. This stone is let well into the mound, with the two faces visible at the corner.

Assuming that these few stones are arranged to dip slightly to the South, those round the corner may be laid level with the corner stone, or they may dip in gently. The stones on opposite sides of a mound should be arranged to dip in the same direction.

We have now put one layer of stones all round a single mound of earth. Let us stop and view our work. If the mound of earth is rather steep, the second layer of stones must be of fair size; perhaps even bigger than the first. We choose from the stone heap half a dozen or so with at least one fairly good and well defined face, and recommence our building where our first stone was laid. The earth requires some management. With a spade we dig a hole a few inches deep for our new stone, and put it in. It must not be on the top of our first stone, but 3-6 ins. behind it, leaving a tempting "pocket" of earth between. The rest of the stones are arranged in a similar manner, dipping in the direction of the bottom layer, and leaving some good pockets for rock-plants. Go round the mound and put on stones in the same manner, making them all lean slightly into the mound and avoid overhanging the pockets below.

With a third layer a difficulty may be encountered at each valley. The main lines and dip of the stones should be continued across the valleys when possible, but leaving a gap or cutting, the sides of which may be steeper than that of the side of the mound facing the path. For the corners of a valley choose a stone showing the bedding line on one face to continue the main line and dip on the opposite side of the valley, and having a craggy broken-off appearance at right angles, for the side running up the valley.

It is important that these corner stones should be rather long and set very firmly in the soil, or they may slip or tilt down and spoil the continuity of the main lines of the front.

Now we can get on better. We can lay another layer of stones along the same direction as the stone just laid, finishing off as usual with an out-cropping stone.

The next layer may be laid similarly. There must be a sloping craggy stone at the lower end and a steep out-cropping stone at the top end. And so we go on laying layers of stone till we reach the top of the mound.

The top is generally a difficulty at first. If the mound is fairly large the top will of necessity be a flat one or nearly so. Rather than use more soil, and pile up stone to make the mound have a conical appearance, I would either leave it as it is and plant a few dwarf rock-garden shrubs thereon (see next chapter), or I would partly sink a few stones in it, to give it an appearance similar to that of the moors in Derbyshire, that of "stray rocks" lying as they were left by nature, with soil creeping over them.

The stones used for the building up of the mound should not be put too close beside each other. A gap of 3-9 ins. between each is useful, and the soil can be held up by a smaller piece of stone, thus forming a neat "pocket." The soil between the first, second, third, and other layers of stone may be divided into pockets by inserting small thin stones across the width. These should only just show above the soil.

Such is the way, to my mind, of building up a rock mound, and every rock mound is a unit of the rock-garden. The same process may be carried out with the other mounds. And if there is sufficient space it is interesting to have the rock dipping a different way; the rock-garden then appears more artistic than if they are all arranged to dip the same way throughout the garden.

The mounds having been built they must be united. Up to the present the garden consists of separate units with soil paths between them. To incorporate these into one

rock-garden, the paths must be properly made. It is best to have the central path ashed, or made with limestone chips. The smaller side paths may be paved with flag-stones. The making of garden paths is fully described in Chapter XVI.

When the rock-garden has been completed so far, go over the stones and see that they are firm. Push the soil down between them, round, and under them, with your hand—a cruel job unless the finger nails are cut very short. More soil will be needed to fill up pockets. The more soil used the better will be the result. Faulty pockets can be improved by the addition of a few small stones, arranged so as to hold in the soil. If a stone is badly placed do not be afraid to take it out and re-set it. The bedding lines on the stone show the directions in which the dip should be.

Finally, when all is in place go over the rock-garden again with a pail of fine limestone chippings, and sprinkle them freely over the surface of the soil. This will keep the soil sweet and conserve moisture.

Building on a Bank :—I have mentioned that a rock-garden can be made on a natural existing bank ; but it is not so easy to get a good effect, and the number of possible aspects is limited. Only two dips are usually possible without cutting mounds and winding paths into the bank itself. For example, if the bank runs East and West and faces South, the two possible dips for the rock are East and West, and the prevailing aspect will be South. But even so with care and trouble a pretty rock-garden may be made.

About midway up the bank a winding path may be cut running East and West. This should be at least 2 ft. wide. At the foot of the bank there should be another path, perhaps separating the herbaceous border from the rock-garden. And at the top of the bank there should certainly be another path. Without much moving of earth it is possible to arrange little winding alleyways 1 ft. wide, with steps across the bank, connecting the centre path with these at the top or bottom. One every 12 or 14 ft. if desired. They should

be flagged in the manner described in Chapter XVI. In this case it is better to arrange the paths first and work in the rocks later.

The actual building should be carried through as already described. Stones should be laid in horizontal lines dipping slightly to East or West, or in some parts they may dip both ways forming, as geologists call it, an "anticlinal." They should not dip steeply, or be too close together, or the bank will have too craggy and fortress-like an appearance. The dipping rocks may be cut off by craggy-faced stones where a path or alleyway runs through them, and the line continued on the other side of the alleyway, imitating a cutting for a road through a rocky spur. If the bank is necessarily steep, use two medium-sized stones rather than one thick one. Push as much earth as possible between them with your hands, and arrange them so that they slope gently backwards, otherwise the plants will get no water.

Good soil should be plentifully used on the bank and every stone set firmly. No mortar or cement should be used, for it is quite possible to set the stones without them. If there can be a level strip 2-4 ft. wide at the top of the bank, stray rocks can be set in the soil as already described, and they will look well.

The building of a rockery in a long narrow border or in a corner between two walls needs no special description. The rocks should be firmly set in layers dipping gently in one or at most two directions. The rockery should not be too steep or its appearance will be spoilt.

Mistakes to Avoid :—There are several mistakes to avoid in the construction of a rock-garden. I have already mentioned some, including the use of overhanging stones. Plants cannot live without sun, air, and moisture, which they do not get as they should if they are overhung. Another error is that of providing too little soil. Rock-plants cannot live without soil, and the more they can have the better. It is no good merely putting it on with a trowel; it must be pushed down at the side of the rocks,

between them or under them, to fill up air cavities, which are injurious to the roots of many rock-plants.

The mistake of too little soil is, of course, practically the same as too much stone. And yet there is a difference. There may be plenty of soil for rock-plants to thrive in, and yet too much stone. The fact to be remembered is that the stones are necessary only to hold up the soil. In building a rock-mound, for instance, near the top, ask yourself, "Is this layer of stone necessary?" If the soil will pull down to the rocks that are already placed, another layer of stone is useless. Too many rocks are indeed a great fault: they make the rock-garden steep and ugly. Ask yourself at each layer of rock whether it is necessary before placing it, and you will not go far wrong.

Then again, do not try to build a rock-garden in rainy weather, when the soil has become pasty and muddy. To put such material between the stones or behind them is almost equivalent to using mortar or cement, and equally detrimental to rock-plants.

Rock-gardens can be built any time between September and April, but a dry day when the soil is friable should be chosen.

The Culture of Rock-Plants :—When the rock-garden is finished it is best to allow it about three weeks to "settle," before being planted.

Rock-plants may be planted at any time so long as they are well looked after. But the best months seem to be October and February, or March and April. The plants should be obtained at a nursery, and got in as soon as possible. Small plants are better than big ones.

The actual planting should be done with a trowel when possible, and when this is not possible the fingers must be used, and perhaps a few bits of stick. The planting of ordinary pockets is fairly easy. Holes are taken out well back, with the trowel, and large enough to hold the plant without cramping. The plant is put in, the soil drawn round it and made very firm.

Crannies or niches between the rocks are more difficult.

A little of the soil should be scraped out with the fingers, or with a stick ; a small plant pushed into the hole, and the soil made as firm as possible. If the weather is dry at the time, a good watering will be necessary at once. But a fine rose should be employed, otherwise the soil will be washed away.

Once planted, the work on the rock-garden is light, and full of interest. First of all, it is important to weed frequently, searching for them and removing them. Dead leaves and flower stems must be cut off at once and some of the more robust plants should be cut back after flowering. If the summer is a dry one, watering should be repeatedly resorted to. But it must be thorough. The same general rules hold good for watering rock-gardens as for watering other parts of the garden ; the subject is discussed at length in Chapter XVIII.

Not until the autumn will any top dressing be necessary, but after that top dressings should be given every six months, especially to plants situated in places where the soil is slowly washed away. The top dressing may consist of equal parts meadow loam and best leaf-mould, and to each two parts of this mixture add one part old hot-bed manure, or very rotten stable dung. The materials should all be mixed together, and rubbed through a $\frac{1}{4}$ -in. sieve. It should be applied with a trowel round the plants and made firm.

Some of the rock-plants described in the next chapter require protection in the winter. In these cases small stones should be laid on each side of the plant, and a sheet of glass placed over the top a few inches above it. This will allow access for air and protection from heavy rains.

Some may like to try to raise rock-plants from seed. There is no real difficulty in this, although some seeds are a bit shy at germinating. A few seeds may be dropped into crannies and niches between the rocks and lightly covered with soil. Or the seed may be sown very thinly in the pockets, and lightly covered with sandy soil. When they

come up do not disturb them too soon. But when they become crowded, they can be carefully lifted and planted in other parts of the rock-garden.

Another method is to sow in pots of light soil in a cold frame in March or April. Only a few seeds should be sown in a small pot. Water very carefully, and when large enough prick off singly into very small pots ("thumbs"). Keep them in these till at least the following April, and then carefully plant out.

I hope to speak of increasing rock-plants from cuttings in Chapter XXII.

Concluding Remarks :—From what has been said in this chapter it will be evident that in a district where there is no good natural stone, and a supply of meadow loam, rock-gardening is apt to be expensive. But I need hardly say that the result is usually more than worth the expense. If the amateur has not a very deep pocket, there is no reason why he should not carry out the work by instalments. I know of several rock-gardens which were built gradually over a period of many years. And the same course may be followed with the plants. A few strong sorts planted first, and more interesting or fascinating little subjects added from time to time. It must be admitted that the plant item alone is a somewhat serious one to most people. Some of the prettiest rock-plants are expensive, but if a collection is made gradually one does not feel the expense at all. This is where the raising of plants from seed comes in. It is cheaper than buying plants but needs more patience. Or again, pieces of lovely rock-plants may be collected from the limestone rocks at holiday times.

While the collection is accumulating I would plant a part, but by no means all, of the rock-garden, with such strong plants, as *Arabis*, *Aubrietia*, *Cerastium*, *Lithospermum*, and *Sedum Acre*. These will give a good display, and will show in a very short time what masses of colour may be obtained in the rock-garden.

If other plants than the strong ones just named are bought, the question arises how many of each to get.

Opinions differ. Some recommend half a dozen for a rock-garden of fair size, growing them in various positions as an experiment. This is quite a good plan so long as the rock-gardener does not want to grow too many kinds. For my own part I would get two plants of each sort for a rock-garden of fair size, and one for a small rock-garden.

A word must be said about labelling rock-plants. My own view is that the label is very necessary. I would never buy rock-plants without having legible labels on them. It adds considerably to the interest of the rock-garden to know the full name of the plants. As regards those collected from the hills, good nurserymen are usually able and willing to name them when in bloom. But many gardeners say that labels look extremely ugly, that renewing them is a nuisance, and that a beautiful rock-garden can be spoilt by labels.

CHAPTER XI.

WHAT TO GROW IN ROCK-GARDENS.

IN the course of a somewhat lengthy letter a friend who had just built a rock-garden once wrote to me—"I have been to see the noted rock-gardens one hears so much about, but I am more bewildered by them than you can think. They contain thousands of sorts of plants. I go and look at them. I wonder 'Will this suit me?' 'Is this hard to grow?' and I come away baffled. What shall I grow? How many of these are suitable?"

This is the case with many beginners. The advice given "to go and study the rock-plants in a big rock-garden" is good enough, but it is apt to lead to confusion. It is only possible in the space at my disposal to refer to some of the subjects most deserving of attention.

Acanthollimon Glumaceum :—This is a pretty little plant for a sunny position in the rock-garden. Its rose flowers are given from July to September. Height about 6 ins.

Achillea :—This spreads rather rapidly and should not be put near very choice things. It does well in any good soil, and can be planted in the autumn or the spring. It can also be raised from seeds sown in the spring.

Good Varieties.

Achillea

argentea (white), July–Sept. 6 ins.

rupestris (white), June 4 ins.

Æthlonema :—There are several good sorts of this, and they are all pretty rock-plants. They are not hard to grow provided they are given a rather poor sandy soil. They

are propagated by seeds or cuttings, and are benefited by being cut back a little after flowering. Plant November or March. They should not be placed near choice things.

Good Varieties.

Æthionema

<i>cordifolium</i> (pink), June-Aug.	..	..	8 ins.
<i>grandiflorum</i> (rose), June-Aug.	..	..	6 ins.
<i>pulchellum</i> (rose), July-Aug.	..	..	6 ins.

Ajuga :—There are many better things than this, but as it is an easy plant to grow and also quite pretty I include it. Its fault is the way it has of spreading, so it should be planted away from choice things. It can be planted in November or March, or raised from seeds sown in March or April.

Good Varieties.

Ajuga

<i>Brookbanki</i> (blue), June.	..	..	8 ins.
<i>reptans variegata</i> (blue), June.	..	..	3 ins.

Alyssum :—A well-known rock-plant, easy to grow, succeeds admirably in town gardens, and flowers profusely (especially *A. saxatile*). It is propagated by seeds or cuttings, planted in November or March, cut back after flowering, and otherwise left to itself. It should be planted so that it can drape the rocks. It may be used along with *Arabis* and *Aubrietia*.

Good Varieties.

Alyssum

<i>alpestre</i> (yellow), June-July	..	..	3 ins.
<i>argenteum</i> (yellow), May-July	..	..	10 ins.
<i>saxatile citrinum</i> (yellow), April-June	..		6 ins.
<i>saxatile compactum</i> (yellow), April-June			9 ins.

Anchusa myosotidiflora :—This is a pretty little rock-plant about 1 ft. high, quite hardy in most districts, with glorious blue flowers. It begins to flower in June, sometimes earlier, and if care is taken, it will bloom more or less continuously till the autumn.

Androsace :—These plants are full of interest to the rock-gardener, and they are not difficult to grow. A fairly

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dry position in the winter is more or less essential, and they may well be planted in crannies between the rocks. They are small but delightful plants, and rock-gardeners are certain to fall in love with them. Most of them require the protection of a piece of glass during the winter, and it is well not to buy new plants until the spring. Good varieties are fairly numerous and all the plants are beautiful. The following are recommended:—

Androsace

arachnoides (white), June-July	3 ins.
carnea (rose-pink), July	3 ins.
lanuginosa (rose and yellow), July-Sept.	6 ins.
sarmentosa primuloides (lilac), July-Aug.	3 ins.
sempervivoides (purple), May-June ..	6 ins.
vitaliana (yellow), March-April	2 ins.

Anemone:—There are several good sorts of this, and it is one of the best plants for the rock-garden. *Anemone pulsatilla* (described in Chapter VII) should be grown, also the white sort, *A. p. alba*. Other suitable kinds are *A. appenina* (6 ins., blue, April-May), and its white variety *A. a. alba*; *A. blanda* (6 ins., blue, April), and *A. nemorosa rosea* (6 ins., rose-pink, April). Other sorts are numerous, and a whole chapter might be devoted to a description of their loveliness. Any soil seems to suit, but the position should not be too sunny. They can be planted in the autumn or spring.

Antennaria:—These are pretty little plants for dry sunny spots in the rock-garden. Any soil seems to suit them, and they can be planted in November or March, or raised from seed sown in the spring.

Good Varieties.

Antennaria

dioica (pinkish), June-July	3 ins.
dioica tomentosa (white), June-Aug. ..	1 in.

Anthyllis montana:—Very hardy, and quite beautiful. It should generally be planted in an open sunny position, in November. Ordinary soil suits it. The flowers are

pinkish and given freely in May and June. Height about 6 ins.

Arabis :—I need not say much about this well-known plant, most people look upon it as an old friend. It should be planted where it can droop over large stones and should not be near more delicate plants. It should generally be cut back several inches after flowering. It comes freely from seeds or cuttings, can be planted in November or March, and will thrive in a sunny position in most soils.

Good Varieties.

Arabis

albida (white), April-May 6 ins.

albida fl. pl. (double white), April-June 6-9 ins.

Aubrietoides (pink), March-May .. 3 ins.

Arenaria :—There are many kinds and they are all suitable for the rock-garden. Try *A. grandiflora* (4 ins., white, May-July), and *A. montana* (6 ins., white, April-June). They are not difficult to grow if given an ordinary soil and an open position.

Armeria (*Thrift or Sea Pink*) :—It does well in an open sunny position so long as it has a light sandy soil. It can be planted in October or March, or raised from seed sown in April in a frame. When the plants have finished blooming, the flowers should be cut off. Masses of this plant look well. It may also be used as an edging plant.

Good Varieties.

Armeria

cephalotes (pink), June-July 12 ins.

maritima (pink), May-Aug. 6 ins.

Aster :—There are several good alpine varieties suitable for the rock-garden. Try *A. alpinus albus* (4 ins., white, June), and *A. a. speciosus* (9 ins., violet, June). Asters do well in sunny positions and ordinary sandy soil. They may be planted during November or March.

Aubrietia :—Considered one of the easiest of all plants to grow in rock-gardens, but it is difficult to get it established in town or suburban gardens. In the country

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it grows without any difficulty producing one mass of gorgeous flowers in the spring. Ordinary sandy soil suits it, and autumn planting is preferable. It can be raised from seeds, or increased by cuttings, and when once established is best cut back slightly after flowering. It should be planted where it can scramble down over large stones.

Good Varieties.

These are extremely numerous, but try :—

Aubrietia

Dr. Mules (purple), April-June	4 ins.
Fire King (red), April-June	4 ins.
Lloyd Edwards (blue), April-June	4 ins.
Moerheimii (rose-pink), April-June	4 ins.
deltoides (violet), April-June	3 ins.

Campanula :—There are a host of Campanulas which are eminently suitable for the rock-garden. I confine myself to mentioning a few good sorts and refer the reader to trade catalogues for others. Campanulas do well if they are grown between the stones in the rock-garden, and flower remarkably freely. Plant in the autumn or spring in light soil, the position need not be too sunny. They can be increased from seeds. *C. glomerata* described in Chapter VII is also suitable for rock-garden culture, but it is not so fine as some of those given below.

Good Varieties.

Campanula

carpatica (blue), July-Aug.	12 ins.
carpatica turbinata (purple), June-July	6 ins.
garganica hirsuta (blue), July-Sept.	4 ins.
mirabilis (blue), July	9 ins.
muralis (blue), May-Aug.	3-6 ins.
pulla (violet-blue), June-July	4 ins.
pusilla Miss Willmott (blue), June-July	6 ins.

Cerastium (*Snow in Summer*) :—Extremely easy to grow,

and will do in any open position. It should be planted away from all choice things, for it spreads by root and stem, and should be cut back several inches after it has finished flowering and in the autumn. It can be propagated by cuttings. Used for covering large stones or slopes in the rock-garden it looks wonderfully well, and is a mass of white flowers in June and July. The two best varieties for amateurs are *C. Biebersteini* and *C. Tomentosum*. Both average about 6 ins. in height, and are white.

Cheiranthus alpinus :—This is a delightful little trailing plant which thrives in any well drained soil. Plant so that it can fall over stone. It blooms freely, giving remarkably pretty yellow flowers in May and June. Height 6 ins.

Convallaria majalis (*Lily of the Valley*) :—Quite a useful rock-plant. A semi-shady position suits it best, and it thrives on a gentle slope. Plenty of leaf-mould is advisable. Height 6–12 ins., it flowers in June.

Crucianella stylosa :—Will thrive in most positions. The soil should be dry and contain chalk or lime. The flowers are rose-coloured, and given freely most of the summer. Height about 6 ins. It spreads rapidly when once established, so it should not be set near choice plants.

Cyclamen :—Many people imagine that hardy Cyclamens are difficult to grow, but really there is no difficulty. They need a light soil with plenty of leaf-mould added, and a warm sheltered position. Spring planting is advisable.

Good Varieties.

Cyclamen

<i>Atkinsii rubrum</i> (rose), April–May	..	6 ins.
<i>ibericum</i> (crimson), Feb.–April	.. ..	3 ins.
<i>repandum</i> (red), April–May	.. ..	4 ins.

Dianthus :—Any of the countless varieties described in trade catalogues can be tried in the rock-garden. They do well if given ordinary positions and light soils. Two good ones to begin with are *D. alpinus* (6 ins., rosy-red, May–July), and *D. neglectus* (6 ins., bright rose, May–July).

Draba Brunicifolia :—This is a very pretty yellow-flowered rock-plant coming into bloom in March, and often continuing till June. It requires a light soil, and is of compact growth. Height about 3 ins.

There are many other Drabas, but the amateur is recommended to begin with this one.

Dryas Octopetala :—A pretty white-flowered rock-plant rather similar to some Anemones. It is of creeping habit and quite easy to grow if given a peaty soil in a sunny position. Plant November or March. Its flowers are given in May, June, and July. Height about 4 ins.

Edralanthus Graminifolius :—This is a fine little rock-plant. Its flowers are similar to those of the Campanula, and are produced in May. Height about 3 ins. Plant in November or March.

Erigeron :—The two Erigerons described in the chapter on "Some Popular Perennials" may be used in the rock-garden as well, but they are not so suitable as the dwarfer sorts. These latter are of very easy culture. Any ordinary sunny position and good soil suits them, and they will do well if planted in November or March.

Good Varieties.

Erigeron

alpinus (blue), June-Aug.	..	..	9 ins.
aurantiacus (orange), May-July	..	..	12 ins.
mucronatus (pink), July-Sept.	..	..	4 ins.
Philadelphicus (purple-rose), May-Sept.			12 ins.

Gentiana :—Gentians are easier to grow in Switzerland than in England, and those of my readers who have been abroad will have seen them growing wild on the Alps. It is not easy to get them to bloom in town gardens, for the conditions in which they grow in the Alps cannot be imitated here. They like as much warmth as possible in the spring, but in the summer dislike heat. Abroad they are usually covered up by grass or other plants after their flowering season is done. A dry position is required in winter, but a moist one in summer, and they prefer a soil with peat in it. Plant in October or March.

Good Varieties.

Gentiana

acaulis (deep blue), March-June .. 6 ins.

verna (blue), April-May 3 ins.

Geranium (*Crane's Bill*):—This is quite distinct from the geraniums or pelargoniums used for bedding out. It does well in a partially shaded position, but will also do splendidly in a sunny site in the rock-garden. Ordinary good soil suits it. Plant November or March.

Good Varieties.

Geranium

argenteum (bluish-pink), May-July .. 6 ins.

cinerum (purple-red), May-Sept. .. 6 ins.

sanguineum (rich crimson), June-Aug. 9 ins.

Gnaphalium leontopodium (*Edelweiss*):—This is the Edelweiss of the Swiss Mountain. It is not easy to grow in England. It is best planted in very sandy soil in March. Height 3 ins. ; white flowers produced in June and July.

Helianthemum (*Sun Rose*):—Can be used as an edging to the perennial border, as well as for the rock-garden. In the rock-garden it is best to plant it where it can fall over the stones ; and it must be cut back after flowering to keep it neat. After a few years it gets very straggly, so that new stock should be obtained. This can be done by propagating by seeds in the spring ; and by cuttings in the late summer. There are numerous named sorts originating from the type *H. vulgare*, including a colour range of orange, red, rose, pink, yellow. Most of them are 4-12 ins. high, and flower continuously during the summer months. They are wonderfully bright plants for the rock-garden, and a dry sunny position suits them best.

Hepatica:—There are a number of beautiful forms of this plant which are all worthy of a place in large rock-gardens. Perhaps the best to begin with are *H. triloba*, (4 ins., blue, Feb.-May) and *H. angulosa* (6 ins., blue, Feb.-April). Their culture is easy, similar to that of the *Anemone* described in this chapter.

Hypericum (*St. John's Wort*, *Rose of Sharon*):—Quite

valuable for the rock-garden, and should be planted in sandy soil in a sunny position in October or March. They may be propagated by seeds sown in the spring or by cuttings in August.

Good Varieties.

Hypericum

coris (yellow), June-July 6 ins.

olympicum (yellow), June-Aug. .. 12 ins.

***Iberis sempervirens* (*Candytuft*)** :—This is the perennial Candytuft, a grand plant for drooping over stones in the rock-garden. Ordinary soil will suit it and a sunny position. There are several hybrids which are good. The height of *I. sempervirens* varies from 4-12 ins. Its white flowers are borne freely every spring.

Linaria :—There are many better things for rock-gardens than *Linaria*, but as they are quite pretty plants and easy to grow if given ordinary positions, I include them. They spread quickly.

Good Varieties.

Linaria

alpina rosea (rose-pink), May-Sept. .. 4 ins.

pallida (violet), May-Sept. 6 ins.

Lithospermum :—An easy quick growing plant for the rock-garden. It often grows too freely and is inclined to cover up other plants, but it can be kept in bounds by cutting back slightly after flowering. It thrives best in a sunny position in a light sandy soil, and can be planted in November or March. Propagated by seeds or cuttings.

Good Varieties.

Lithospermum

intermedium (blue), June-Aug. .. 9 ins.

prostratum (blue), April-Aug. .. 4-6 ins.

Lychnis :—The *Lychnis* is a very good plant for the beginner's rock-garden, for it is of quite easy cultivation. Good light rich moist loam and a sunny position suit it, and it can be planted in November or March. *L. Haageana* described in Chapter VII is suitable for the rock-garden.

Good Varieties.

Lychnis

alpina (pink), April-June 6 ins.

Lagascae (rose-pink), June-Aug. .. 4 ins.

Viscaria alba (white), May-Aug. .. 12 ins.

Nepeta Mussini :—A useful, easily grown rock-plant, producing lavender blue flowers throughout the summer, commencing in May. It is useful for hanging over good sized stones, or may be planted on a gentle slope close to the base of the rock-garden. It is not at all fastidious as to soil or position, and will do quite well in a shaded site. Height about 12 ins.

Onosma :—This should be grown in all rock-gardens of good size. It is not hard to grow and does well in crannies between stones where there is plenty of soil. The position should be high and dry, and sunny, but it must be arranged so that the roots can go down and find moisture. Plant in November or March.

Good Varieties.

Onosma

alba rosea (white changing to rose-pink),

June-Sept. 9 ins.

taurica (yellow), May-Aug. 6 ins.

Oxalis enneaphylla :—A pretty free-growing little rock-plant which does best in partial shade such as is afforded by a North-West aspect. It does well in a sandy soil, but it is important that no lime should be present; plant near sandstone rocks. It does not matter much when it is planted; any time between November and March being suitable. Height about 6 ins. The flowers are white and large, produced in June and July.

Phlox :—The alpine species are distinct from the border varieties mentioned in Chapter VII. Many of them are extremely beautiful and quite easy to grow if set in pockets of well-drained soil in a sunny position. In the summer they require watering, and the more robust sorts must be cut back slightly. They can be planted in October or

March, and arranged so that they grow over the stones. Some people think they are not hardy, which is quite a mistake. But a damp sunless site will soon kill them.

Good Varieties.

These are extremely numerous, but the reader should try some of the following :—

Phlox

<i>amœna</i> (rose-pink), April-June	6 ins.
<i>divaricata</i> (blue), May	12 ins.
<i>ovata</i> (rose-red), May-July	4 ins.
<i>reptans</i> (red), April-July	4 ins.
<i>subulata</i> (pink), May-Aug.	6 ins.

Many beautiful varieties of the last are described in trade lists.

Polemonium reptans :—A fine creeping rock-plant carrying blue flowers, well worth a place in any garden of fair size. There is little difficulty in its culture, except that grubs are rather fond of it. The flowers are given in the spring (March-May). Height about 9 ins.

Polygonum :—There are many finer things for the rock-garden than Polygonums, but they are easy to grow and fairly pretty. Good sorts to try are *P. alpinum* (12 ins., white, May-June), and *P. vacciniifolium* (6 ins., rose, July-Sept.). Rich ordinary soil and a sunny position suit them. Plant November or March.

Primula :—The varieties of *Primula* suitable for the rock-garden are very numerous, but I have had very little experience of them. For my own part, I think there are many more suitable things for the amateur's rock-garden than *Primulas*, which are not easy to grow in town gardens. Many of my friends have them and they seem to do fairly well in sunny or half-shady positions in good soil. But I understand that it sometimes takes a long while to induce them to bloom.

Ramondia :—This is a pretty plant with leaves clustered in the form of rosettes, worthy of a place in rock-gardens of fair size. A compost of sandy loam, peat, and leaf

mould suits it. Plant in niches between the rocks in a lightly shaded position, in February or March.

Good Variety.

Ramondia pyrenaica, (violet-purple), May—

Aug. 6 ins.

Saponaria ocymoides :—This is a recognised rock-plant, but it has been recently stated that it is a plant to beware of on account of its spreading roots. However, if it can be given a piece of ground to itself and kept in its place, it is quite worthy of being included. The flowers are bright pink, and freely produced from June onwards into the autumn. Height about 3 ins. Plant in the autumn or spring in any ordinary soil.

Saxifraga :—The genus *Saxifraga* includes some of the very best and most entrancingly lovely rock-plants. A rock-garden without saxifrages is unthinkable. Most of them grow with remarkable ease, and all should be given a sunny position. The encrusted section are useful for planting in niches between the rocks, but the mossy sorts do better in gently sloping pockets. They can be planted (if obtained in pots) at any time throughout the year, but the best periods are October, March, or April. Small plants are better than big ones for planting. In dry weather they must be watered, and with young plants it is specially important to remove dead flowers.

Good Varieties.

The Saxifrage being such an important rock-plant, I give a fairly comprehensive list. But I have no space to describe the hundreds of varieties now existing. New sorts come out every year, and it is difficult for the average gardener to keep pace with them. Saxifrages are a wonderful study in themselves, and those readers who would care to go into the matter more fully are recommended to read "*Saxifrages or Rockfoils*," by W. Irving and R. A. Malby. The sorts named below include some of the best. I have myself described some in the gardening papers, and given fuller particulars than it is possible to do here.

106 JOTTINGS OF A GENTLEMAN GARDENER

Saxifraga

aizoides (yellow), July, Mossy ..	6 ins.
aizoon, many varieties (white, yellow, rose, pink, etc.), May-June, Encrusted	6-12 ins.
apiculata (yellow), March-June, Mossy	4 ins.
Apple Blossom (pink), Feb.-April, Mossy	3-4 ins.
aretioides (yellow), June	6 ins.
Bakeri (crimson), April-May, Mossy ..	6 ins.
bifurcata (pure white), May-July ..	3-6 ins.
Boydii (yellow), March-June	2-3 ins.
Burseriana (white), April, Mossy. Several varieties of this all bearing white flowers	6 ins.
Cherry Trees (yellow), April	3 ins.
Clibrani (crimson), May-June, Mossy	6 ins.
cotyledon pyramidalis (white), June, Encrusted	3-6 ins.
cristata (white), May-June, Encrusted	3 ins.
cuneifolia (white), May-July	6 ins.
decipiens grandiflora (rich crimson), April-June, Encrusted	9 ins.
Elizabethæ (yellow), April.	3 ins.
fortunei (white), June-Aug.	12 ins.
granulata fl. pl. (double white), April- May	9 ins.
Hosti (white), May, Encrusted ..	12 ins.
hypnoides (white), May-June, Mossy	3 ins.
longifolia (white), May-Aug., Encrusted	18 ins.
luteo-purpurea (yellow), March-May, Mossy	4-6 ins.
marginata (white), April-May, Encrusted	4 ins.
Megasea. Many beautiful sorts of this (crimson, rose, pink, purple, white, etc.), April-June	6-12 ins.
muscoides (yellow), May, Mossy ..	3 ins.
mutata (yellow), May-July	6-12 ins.

Saxifraga (continued)

oppositifolia. Several lovely varieties of this (rose, lilac, red, white, etc.), March-April .. about 2 ins.			
peltata (rose), April-May	2-4 ins.		
punctata (white), May-June	9 ins.		
Red Admiral (crimson), May-June,			
Mossy	9 ins.		
sancta (yellow), April-May	3 ins.		
trifurcata (white), May-June, Mossy	6 ins.		
umbrosa (London Pride), (white, and pink), May-July. (Will do in shady position) 9-12 ins.			
Wallacei (white), April-May, Mossy ..	6 ins.		

Sedum :—Quite easy to grow. Begin with *S. Acre* (3 ins., yellow, May-June), and *S. album* (3 ins., white, June-July). Then try *S. aizoon* (12 ins., yellow, July-Sept.); *grandiflorum* (3-6 ins., yellow, May-July); *Kamtschaticum* (9 ins., yellow, July), and *spurium* (6 ins., pink and white, July-Aug.). *Sedum spectabile* described in Chapter VII may also be grown. All these will do in any good soil, in a dry sunny position. They can be planted in fissures between rocks or in pockets. Plant in November-March.

Sempervivum (*Houseleek*) :—There are numerous beautiful varieties suitable for the rock-garden. The plants like a dry position and can be planted in the same manner as Sedums.

Good Varieties.

Sempervivum

arachnoideum (pink and purple), July ..	6 ins.
calcareum (red), July	6 ins.
montanum (red), June	6 ins.

Silene :—A pretty plant for the rock-garden, and not hard to grow. A peaty soil is necessary for *S. acaulis* (3 ins., rosy-pink, April-May), but those given in the following list will do well in any ordinary soil. *Silenes*

revel in sunshine, and like being planted in niches between stones. Plant October or March.

Good Varieties.

Silene

alpestris (white), May-June	.. ..	4-6 ins.
asteria (red), July	.. ..	12 ins.
Elizabethæ (rose), June-Aug.	.. ..	4 ins.
maritima, fl. pl. (double white), June- July	.. ..	2 ins.
Schafta (rose), June-Sept.	.. ..	4 ins.

Valerian :—This, described in Chapter VII, is also useful for the rock-garden.

Veronica :—There are a large number of Veronicas which are suitable for the rock-garden, many thriving excellently in any moist ordinary soil. They are useful for covering stones in the rock-garden, and can be planted in rock crannies in the months of October and March. They all flower freely and are extremely showy.

Good Varieties.

These are extremely numerous. I have only space to name a few.

Veronica

alpina, many lovely shades, May	.. ..	3 ins.
gentianoides (violet), June-July	.. ..	12 ins. or more
prostrata (blue), June-Aug.	.. ..	4 ins.
repens (white), May-June	.. ..	3 ins.
saxatilis (pale blue), June	.. ..	4 ins.
spuria (sky blue), June-Aug.	.. ..	12-18 ins.

Vinca (Periwinkle) :—Useful and showy in the rock-garden, but spreads too quickly to grow in the neighbourhood of choice plants. Any rough sunny position suits it. Plant November or March. It will also do in shady spots.

Good Variety.

Vinca minor, several beautiful shades of blue,

and purple, also white, June-Sept. 4 ins.

Viola :—*Viola cornuta*, described in Chapter VII, is useful for the rock-garden. Another good variety for the

rock-garden is *V. gracilis*. This is 6 ins. high, and produces from June onwards quantities of lovely violet-blue flowers. Plant in November or March.

ROCK-GARDEN SHRUBS.

A word must be said about a few of the many shrubs suitable for the rock-garden. Generally speaking, any dwarf shrubs may be planted. They can be used for the summits of mounds or spurs of the rock-garden, as a boundary to it, or as a shelter in it for other choicer plants.

Small plants of Laurel, Aucuba, Holly, and Golden Privet are quite useful. The ordinary Privet must not be used. But these shrubs are not so useful as dwarf Conifers (*Picea excelsa*, dwarf Cypresses, and Pines such as *Pinus montana*). I would rather be without Yews, but many people plant them. Other good subjects are the Coton-easters, especially *C. horizontalis* and *C. mycophylla*, *Cytisus argenteus*, *austriacus*, and *biflorus*; *Cistus cymosus*, *crispus*, and *Clussii*; *Daphne Cneorum*, *Mezereum*, *striata*, and *collina*.

A few other shrubs which may be used are *Choisya grandiflora*, *Garrya elliptica*, *Arbutus mollis* (warm sheltered position); *Andromeda polifolia*, *Empetrum nigrum*, *Erica carnea*, *Cinera*, and *Staminea*, *Rhododendron præcox*, and *Raphiolepis indica*.

The rock-gardener should not use more shrubs than he is obliged; too many detract from the beauty of the rock-garden. They should only be used with a definite object such as already referred to, and I do not think they should ever be regarded as absolutely essential.

CHAPTER XII.

ABOUT ROSES.

THE QUEEN OF FLOWERS.

GARDENING is a many-sided subject, there are so many forms of it, so many beautiful flowers to grow, that it is difficult to say which one likes the best. But of all forms of gardening that of rose growing should not be neglected, for this, if it is not the most beautiful, is certainly full of sweet interest.

A critic once asked his hearers to compare a rose border with a good colour perennial border, "Which is the more beautiful?" He was answered at once: "Oh, the colour border of course." "But which would you have if you had your choice?" he enquired. And the answer was: "Oh, the rose border."

Rose gardening is certainly not the most beautiful sort of gardening, but as the rose is a plant so universally known, and one in which the affections of all are so deeply placed, we cannot do without it.

It is not sufficient to go into the country and bring back sprays of wild roses; it is not enough to gaze with loving eyes on the roses in our friends' gardens. We must have them in our own garden. There is something about the rose which compels us to grow it, and that something is summed up in the statement that it is the Queen of Flowers.

No other plant so well repays the trouble bestowed upon it, and no other plant can look more unhappy if this trouble is refused it. To see roses miserable is enough

to make the gardener miserable too; unhappiness is infectious.

Grow roses, wherever you are. Don't be put off by those who tell you it is impossible to grow them in this or that or some other place.

The Culture of Roses :—For our purpose it will be sufficient to divide roses into climbers and dwarfs.

The culture of the climbers is the simplest. Generally speaking, they will thrive and flower freely over arbours or arches if planted in a good sunny position and watered in dry weather. They should not be pruned at all, beyond removing dead wood, although many people remove practically all the wood produced during the summer of the year before, and only train in this year's shoots.

Neither is the culture of dwarfs fraught with much difficulty. If the soil is strong clay, it will, if treated in the manner described in Chapter XXIV, produce wonderful crops of roses. It is light soil which requires the greatest improvement to make it quite suitable for the Queen of Flowers.

In our own garden rose cultivation was at first more difficult than in most cases. There was soil of fair quality to the depth of about 12 ins., not more, and below this was shale and rock from the coal measures. It is no good trying to grow roses on a shallow soil, so we got to work with our tools. We took off the good soil, and then, using pick-axe, crowbar, and sledge hammer, we removed shale and stone, till we had a total depth of about 2½ ft. We were able to get some good meadow loam, and, mixing it with the good soil, we gradually filled up the trench so formed, putting a layer of good manure 12–18 ins. from the surface. This was rather expensive, but it was worth it. Then, after a few weeks, we planted the roses.

The position in which our roses do best is on both sides of a path running roughly North and South. They get all the South sun, and are sheltered to some extent from cold East winds.

Planting is best done in November, February, or March,

and not in April, as is so often done by amateurs. Holes are dug, and the roots of the roses carefully spread out. They are then covered with soil and made very firm by treading. They should be at least 2 ft. apart each way and preferably 3-3½ ft.

In the spring they should be mulched with short manure, and in the following autumn should have 4 ozs. of basic slag per square yard forked in. The following spring some short manure should be forked in round their roots, and they can again be slightly mulched. If this is done, they need not be disturbed for many years.

The pruning of dwarf roses requires care and trouble. We prune all our roses, except climbers, hard in the spring, late March or early April, cutting out a large quantity of the new wood produced during the previous summer. Some people prune weak growers slightly, and strong growers very hard indeed, and they get good results. Generally speaking, all dwarf roses do better with hard pruning, but any study given to individual plants during the summer months will be well repaid if the information gained is used at pruning time.

All suckers from both climbers and dwarfs should be removed at once. A "sucker" is a shoot appearing from below the graft, or below the ground. Suckers weaken the plants very considerably.

Roses on their own Roots :—It will be well to explain what is meant by roses on their own roots. Most of the roses we plant are grafted on a stock, generally briar; but many do tolerably well if grown without being grafted, namely on roots formed from their own growth. Quite good plants are possible, especially climbers, if grown from cuttings.

There are many ingenious ways of striking rose cuttings quickly. The best seems to be that of putting short growths cut below a joint and 6-12 ins. long, into a large glass jar of water. The jar is placed in a very sunny window, and turned round each morning. The water must be changed every day, or it will go bad. After some weeks

roots gradually appear. When there are several from each cutting carefully plant them in sandy soil in the garden. The following spring they can be transferred to stronger soil, and about a year later they should be ready for planting in their permanent positions.

Another way is to cut shoots 12-18 ins. long, make a deep nick in the ground with the spade; throw some sand down, put the cuttings in a row, and firm them well. This is best done in the autumn, and the plants should be ready for removal twelve months later.

The After Treatment :—When dwarf roses have been planted there is important after treatment which must not be neglected. The borders should be frequently hoed and weeds removed.

It is important to cut the flowers regularly, and to remove all dead blooms at once; by this means the flowering season is greatly prolonged and the plants are strengthened.

Watering should be thorough (see Chapter XVIII). As a rule it is not necessary to feed roses, but they may have an occasional dose of one of the liquid manures described in Chapter XIX.

If the foliage is kept damp by spraying in the evenings after hot summer days pests will not be troublesome. For information on this point see Chapter XVII.

I cannot leave the subject of rose growing without mentioning Tonk's manure, which is regarded as indispensable for success by many growers. I have never tried it, but have always been content to use basic slag and short manure. My readers, however, may like to try its effect, and in case they cannot get it ready mixed, I give the formula below. I may say that the formula is no secret, it is public property, so I am quite at liberty to give it here.

FORMULA OF TONK'S ROSE MANURE

Superphosphate of Lime	3 lbs.
Kainit	2½ lbs.
Sulphate of Lime	2 lbs.
Sulphate of Magnesia	½ lb.
Sulphate of Iron (Unoxidised)	¼ lb.

These ingredients should be pounded up separately and mixed together very thoroughly. The material must be kept in a tin with a tight fitting lid to exclude damp. Some rose growers apply this manure in the winter, and some after the pruning is finished. But all agree that the quantity to use is 3-4 ozs. per square yard, and that the manure should be well forked in at once.

Uses of Roses :—The rose as a cut flower is splendid. But it should not be put into tall thin necked vases, it looks too ornate there, if not ridiculous. Large shallow bowls should be used, and if the water is changed frequently, the blooms will last well. There is something so cheering about a bowl full of bright roses, a cheerfulness which is not conveyed by any other flower to quite the same extent.

If there are plenty of roses scent may be made by placing them in adulterated spirit, and by subsequent distillation.

To make Pot Pourri the roses are pulled to pieces, and the petals spread out in trays to dry in the sun. They are then mixed with a compound of spices, such as gum benjamin, cinnamon, storax, and others. The making of this Pot Pourri (which evolves a most entrancing scent) is full of interest, and if the reader is interested he should read the chapter on the subject in Miss Jekyll's fascinating book, "Home and Garden." It deals with the matter fully and gives several old recipes.

Varieties of Roses :—These are legion and I confine myself to mentioning some of those which thrive well in our Midland district. We are only a few miles from iron and steel works, so that what will grow here should grow almost anywhere.

Climbers :—American Pillar (pink); Alberic Barbier (white); Crimson Rambler (crimson); Dorothy Perkins (pink); Gloire de Dijon (salmon-yellow); Hiawatha (crimson); Minnehaha (pink); René André (yellow); and White Dorothy (white).

Dwarfs, etc. :—A. K. Williams (carmine red); Avoca (crimson); Bessy Brown (white); Captain Christy (pale pink); Captain Hayward (crimson-scarlet); Caroline

Testout (pink); Commandant Félix Faure (dark crimson); Dorothy Page Roberts (copper-pink); Dorothy Ratcliffe (red); F. K. Druschi (white); General Jacqueminot (scarlet-crimson); General McArthur (crimson-scarlet); George C. Waud (orange red); Gustave Grunnerwald (carmine); Hugh Dickson (crimson); James Coey (golden yellow); Joseph Hill (pink and yellow); Killarney (pale pink); Lady Ashtown (pink); Lady Roberts (apricot); La France (light silvery rose and lilac); La Trosca (blush); Margaret Dickson (white); Madame Abel Chatenay (rose cream); Madame Edouard Herriot (bright coral red); Madame Ravary (orange yellow); Molly Sharman Crawford (white); Mrs. Aaron Ward (yellow); Mrs. Alfred Tait (coppery-red); Mrs. W. J. Grant (rose-pink); Mrs. John Laing (rich pink); Mrs. A. R. Waddell (salmon-red); Pharisaer (rose-white); Prince de Bulgarie (salmon-pink); Richmond (crimson); Souvenir de Maria de Zayas (sulphur yellow); Ulrich Brunner (crimson red); Victor Hugo (bright crimson); White Killarney (white); and White Maman Cochet (white).

CHAPTER XIII.

INDOOR BULBS.

THE key to the successful culture of indoor bulbs is to make an early start, in order that sufficient roots may be formed before forcing. So, as preliminary advice, I say: Buy good bulbs; buy early, and pot early.

Good bulbs are an absolute necessity for this method of culture, a fact which needs impressing on the minds of amateurs. The bulbs can be bought from any reputable nurseryman. But pay a good price for them.

Last season's bulbs, those forced last year, are of no use for this purpose a second season. New ones should be purchased, and these should be solid, heavy and firm, and of relatively good size. They should also be a good fresh looking colour, and the skin (as of tulips) should be undamaged.

Good varieties as well as good bulbs are necessary for forcing. I give a short list of suitable sorts. For many others see trade lists.

Crocuses.—White, Blue, Yellow, Striped, or mixed varieties.

Roman Hyacinths.—Get selected bulbs from a good firm.

Tulips.—Duc Van Thol, in several varieties; Proserpine; Canary Bird; White Hawk, Rose Grisdelin; Alba maxima; Murillo, and Rubra maxima.

Hyacinths.—Baroness Van Thuyll; British Queen; Gertrude; Marie.

Narcissus.—Poeticus; Bicolor; Empress; Henry Irving.

Double Narcissus or Daffodils.—Orange Phoenix; Golden Phoenix.

There are many other classes of bulbs which can be forced, but they are not so easy as the above.

Bulbs in Pots:—The potting of the bulbs is an important process, upon which success largely depends.

Get ready some good loam, and mix with it a quantity of good sharp silver sand, yellow sand will do at a pinch. Bulbs thrive in sand, so do not stint it. The soil should be good, not poor.

Make ready a quantity of clean pots—scrub them if necessary—and plenty of the yellow fibre which bulbs are sent in, to serve instead of crocks. Begin to pot in September.

Allow one Hyacinth to a 4 in. or 3 in. pot and five or more Tulips to a 5 in. pot, or less if the bulbs are of large size. Crocuses may be planted fairly closely together, say about $\frac{1}{2}$ to 1 in. apart. Narcissus should be planted round the sides of the pot 2 or more ins. apart. Three bulbs of Daffodils will go in a 5 or 6 in. pot.

The top of the bulb may be left only just uncovered but crocuses should be covered. Pot firmly, that is, see particularly that the soil is *firm* about the bulbs. Give the pot a rap against the bench to settle the soil, and after this water slightly.

When all are potted, dig a hole in the garden about 1-1 $\frac{1}{2}$ ft. deep and of sufficient size to hold all the pots without standing on the top of one another. Mark the boundaries by rough boards round the sides or sticks. Then bury the pots completely in sand (ordinary yellow sand will do), ashes, or even earth, and leave them alone for six or eight weeks. It is a good plan to label the bed with the date. Fill up to the original ground level, with sand or soil. For good results pot in September and sink immediately; you will then get early flowers.

Six to eight weeks should allow them time to form good roots, and to start growing; then lift the pots carefully out, or they may be left longer if desired. Now transfer them to an ordinary heated greenhouse, placing the pots on a shelf near the glass to give them as much light as

possible. Water when necessary, and do *not* coddle them unduly.

Hyacinths may require some support as they grow. The wire now sold is convenient, but it must be stuck right into the bulbs, which is a nuisance. A neat raffia tie-up to this will prevent falling.

If a greenhouse is not available, use a frame, place near the glass and keep airy. They may also be brought on in a light sunny window, but frost must be excluded from the room.

After flowering in the home or greenhouse, the dead blooms should be cut off, and water gradually withdrawn. The bulbs may be planted in grass in the spring, or kept till autumn comes round again. They are useless for forcing again.

Bulbs in Bowls :—Bulbs may also be set in bowls in much the same way as in pots. But as these have no drainage holes, water but little, and then transfer them to a cellar for about six or eight weeks ; they must be in darkness but not in frost. Otherwise treat as for pots.

Another and more convenient way of growing them in bowls, is to plant them first in boxes or pots, and transfer them to the bowls when coming into bloom. This is specially convenient where the bowls cannot well be spared for the long period required by the other method. They should be well watered after being repotted into the bowls.

Of late years considerable attention has been paid to the culture of bulbs for the house in cocoa-nut or other fibre. In this case fill the bowls with fibre and charcoal, and pot as already described. Above all, pot firmly. The advantage of fibre is that it is clean to handle, cheap, and easy to work with. Water slightly and transfer to cellar for some time. Then proceed as with pots. An alternative method is to pot in soil to begin with, and replant into fibre, when coming into bloom.

CHAPTER XIV.

BULBS IN BEDS AND BORDERS.

TRUE gardeners feel that they cannot well do without bulbs in the spring. There is something so fascinating in watching them peep through the soil, grow up and send out lovely flowers to tell us that spring and summer with all their joys are coming.

One may try herbaceous plants—wallflowers, arabis, etc.—for spring display ; indeed it may be that we must be satisfied with only these for a season. But bulbs are the things we want for the cheerfulness they impart to our borders in the spring.

In border planting I much prefer to keep the various kinds of bulbs separate and to give each colour a patch to itself. To my mind the effect is far better.

Most bulbs thrive extremely well in a sandy, or even very sandy soil. A heavy soil should be lightened by mixing in a quantity of sand. Daffodils do very well in a border which has been well manured with old dung, but for the other kinds of bulbs no manure should be used, they are better without it. October and November are the best times to plant, the earlier the better, for then they have time to make a good many roots before the cold weather comes on. The ground should have been well forked up and should be in a nice condition ; it is a good rule not to attempt planting when the soil is soaking wet.

Planting should be done with a trowel, holes with flat bottoms being taken out, and the bulbs laid in point

upwards. It is very important that the holes should be large and flat bottomed, otherwise the bulbs will be "hung"; that is, suspended with an air-space below, which is extremely bad for them.

Daffodils should be put in so deep that their tops are about 4 ins. from the surface; tulips, 3-5 ins.; crocuses, 4 ins.; and other bulbs twice or thrice their own depth. Tulips, daffodils, and hyacinths may be planted 5-8 ins. apart, but crocuses, jonquils, scillas, anemones, chionodoxas, fritillarias, ixias, montbretias, etc., may be set in groups much closer.

After they are planted they need little in the way of culture, except that the ground should be hoed once or twice a few weeks later, and again after they have appeared, in order to keep the soil round them open and sweet.

Bulbs should have dead flowers removed, and when spring is over should be lifted and laid in, preferably in a North border, to finish their growth. Then, after a few weeks, they can be dug up, sorted, cleaned, and stored in bags for replanting in the borders or "naturalising," as described in the next chapter, in the following autumn. Bulbs grown indoors should be treated in the same way, and planted in the borders, or far better, naturalised in the manner described in the following chapter.

Colour Possibilities :—I once saw a garden in which each sort of bulb had a separate bed to itself. There was a bed of blue hyacinths, one of red, one of pink, and one of white. Then there were beds for Cottage, Early, May flowering and other tulips, kept in their separate colours; beds containing separate colours of crocuses, and separate sorts of daffodils and narcissus.

I must say I liked this arrangement, but I could not help thinking that the effect would have been much better if the beds had not been scattered over the lawn as they were, but had been together; or even if the patches of separate colours had been planted in a long border. Colour gardening with bulbs is no more difficult than with herbaceous plants, so long as the descriptions of the colours

are true. Some people merely plant a patch with a mixture of bulbs and colours, but the effect is too poor for words.

I think that the possibilities of colour effects with bulbs are great, and the same rules should apply here as are given for perennial plants in Chapter VIII. Separate patches of colour, compounded of bulbs of one species and one variety, and the avoidance of clashing colours, are the points to be borne in mind.

Innumerable named varieties of bulbs are now offered for beds and borders, and described in trade catalogues. Generally speaking the dwarfer hyacinths look best out of doors; and Cottage, Early and May flowering tulips are always pleasing. Any of the cheaper narcissus and daffodils do well and all varieties of the crocus.

The reader is advised to go to a reputable nurseryman or bulb merchant in September for his bulbs. He will advise those which he believes are best for any particular purpose. Good bulbs are rather dear, never buy cheap advertised lots.

CHAPTER XV.

NATURALISING BULBS IN GRASS.

THE culture of bulbs in this interesting manner is not at all difficult. "Naturalising" means growing bulbs in a wild natural manner, and when planted leaving them alone to spread and grow as they please.

But surely it is a mistake to plant bulbs on a lawn, which is a place to be kept trim and neat. It is not natural. The trim condition of the lawn will detract from the beauty of the plants growing out of it, and later on when their flowering is over they in their turn will detract from the beauty of the lawn. A "Wilderness" or Wild Garden or piece of meadowland are the only really suitable places for this form of gardening, and if no one of these is available, I would advise my reader to give up the idea of "naturalising" bulbs in grass.

A site covered with ordinary meadow-grass and perhaps lightly shaded by trees is an ideal sight and may be easily converted into a glorious mass of spring colour.

Colour Effect :—Wonderful colour effects are possible. Large irregular patches look best, not one or two bulbs here, two or three a yard away, and so on, but good sized patches of one sort and one colour with the colouring of each neighbouring patch merging into each other, are what we need. I have seen glorious patches of colour in big wild gardens, and I say confidently that their appearance is far more natural and beautiful than any scattered groups could be.

There is no difficulty in getting these superb sheets of

colour. In trade lists many varieties of bulbs are described as being specially suitable for naturalising. These are always cheaper than those offered for forcing or planting in borders, and if a large area is to be planted a great many bulbs will be required. But go to a reputable nurseryman or bulb merchant and pay a fair price. In my own garden we usually buy fresh bulbs for the borders and for forcing, using the old ones entirely for "naturalising."

Planting :—There is not much difficulty with the actual planting. With a sharp spade partly lift a piece of turf, if the soil is heavy drop some sand in, put in three or four tulips, or daffodils, or half a dozen crocuses, or a couple of hyacinths, arranged in an irregular manner. Then let down the turf and lightly beat it firm with the back of the spade. About 6 or 9 ins. away lift another piece of turf and repeat the process. Then another, and so on, making a large irregular patch.

The best time to do the work is a matter of opinion. We generally plant the bulbs, stems and all, immediately they are lifted from the borders or knocked out of the forcing pots, for it is very convenient. The soil is gently removed, and the bulbs planted in the way just described. The grass is never cut before June or July, by which time the foliage of the bulbs has all died down. It is most important never to cut off the foliage, otherwise the bulbs are greatly weakened.

Some consider it better to defer the planting of old bulbs to August, and to get the new ones in at the same time if possible. There is no doubt in my mind that early planting is good, but I would not say that it is essential. I have seen some fine results obtained in the spring from plantings in the previous October or even later.

Many gardeners use a special tool called a "bulb planter." This takes out a piece of turf, the bulb is dropped in, the turf replaced and made firm. This takes longer, but it is easier, and produces a better effect, for

each bulb is planted in a hole to its self, and cannot jostle its neighbour as is possible with spade planted bulbs.

Avoid any semblance of geometrical form in the patches. The more irregular they are the better, circular and triangular patches only look out of place in such surroundings.

The top dressing of naturalised bulbs is of some importance. It should be done in the autumn, with fine leaf-mould or very old hot-bed manure passed through a $\frac{1}{2}$ in. sieve. Go over the ground and scatter this material freely over the entire surface. The rain will wash some of it through the turf to the bulbs.

The following short list of good varieties may be useful to those who desire to purchase bulbs for "naturalising" in grass, but many other sorts are offered in lists and the reader should consult a good bulb merchant.

Hyacinths.—Any good bedding kinds.

Tulips.—Gold Flake, Sir J. Hooker, Bridesmaid.

Daffodils.—Emperor, Empress, Sir Watkin, Horsfieldii.

Narcissus.—Poeticus, Duchess of Brabant, Gloria Mundi, Red Star.

Crocuses.—Any of the bedding kinds will do well; shades of yellow, blue, white, striped.

Other bulbs which may be naturalised are Scillas, Chionodoxas, Fritillarias, Montbrietias, Ixias, Irises, Roman Hyacinths, Anemones, Ranunculuses, Jonquils, and Aconites. The culture of these is the same as that briefly outlined; many of them love a shady position, and a little leaf-mould in the soil when they are planted is advantageous.

CHAPTER XVI.

GARDEN PATHS.

THE path question is always a difficult one; bad paths may spoil the garden; but every path may be a real joy if it is carefully managed. It really requires an artistic eye to determine the best positions and directions for paths. It is very difficult for an ordinary gentleman gardener like myself to give this information.

I often regret that I have had no real training in landscape or art gardening. What I have learned has been by experiment on a small scale, and from books, but books alone I find are not enough without experiment. I recommend the reader to work for himself. He may read the following notes, but actual experiment with light roughly made paths, which are easily taken up, will teach him a lot more. He should never be afraid to extend his borders and to alter them by altering the paths; for all the while, if he uses his eyes, he will be learning much about the art of path construction and design.

Some Things to Avoid :—I will take the reader in imagination into a garden I once saw, the owner of which was keen on geometry. His borders were circular, triangular, or rectangular; the paths were either made in the shape of very accurate circles, or in long straight lines. His triangular bed was surrounded by pathways forming an outer triangle with angles of 60° . It was a triumph of mathematics, but a very ugly border and path. From the top of the garden one could see a straight path running down to the bottom of the pleasure grounds. It turned at right angles and ran along the bottom, and then turned

again and came straight up to the house. The rock-garden was intersected by paths cut exactly straight, and at right angles. Flower gardens, pleasure grounds, rock-garden and wild garden were completely spoilt. There were no winding paths going this way and that, but a severity and grimness which I have never forgotten.

But there are other ways of spoiling a garden by its paths. Brick paths, for instance, look extremely bad between gay flower borders. Bright red gravel paths look too ornate in the rock-garden, and asphalt paths look fearful in the wild garden. Bright red gravel is suitable enough for the carriage drive. Straight "grim" asphalt, concrete, or tar paths for the vegetable garden; and brick paths will do if properly laid in the ornamental garden.

Avoid making too many paths in a small garden. This is difficult to impress on people's minds. Except in the rock-garden, the paths should be few. There should be some definite object in them. To have small paths meandering all over the place, cutting up the garden into small pieces, is a great mistake, it means that much ground has been wasted. In the rock-garden alone paths should be numerous, in order that the plants may be viewed at close quarters.

Before deciding upon a path carefully consider the questions: "Is it absolutely necessary?" and "Can I do without it?" For example, consider a path to separate the lawn from a flower border. "Is this absolutely necessary?" "Can I do without it?" Well, I don't know. The grass is wet in the winter. But then the border does not contain plants which bloom in the winter. When I dig the border I can leave my barrow at one end or put boards on to the grass to wheel it on. Therefore the path is not necessary. So do not cut it.

Finally, avoid making a path too narrow. A width of 2 ft. is not enough. You and your "better half" cannot walk arm-in-arm on such a path, and it is quite important to be able to do this in a garden! Your girls soil their dresses against the taller plants in the beds, and you

yourself cannot wheel a barrow comfortably along such "alleys."

The Planning of Paths :—The actual planning is not a matter of great difficulty. Most paths should wind gently in and out of flower borders, curving one way and then another, by which means it is possible to arrange many delightful surprises in borders of good length.

The actual planning is done with flower sticks and a tape measure ; 5 ft. wide is not too much, but 4 ft. will do. Two sticks are put in, one on each side of the proposed path, the measure being used to find the right width. A couple of feet away two more sticks should be put in ; and so on every 2 ft. Curves should not be angular, though at times they may be fairly sharp. The planning of curves is a little difficult, but can be done if several sticks are put in where there would be only one if the path were straight. It is also a little difficult to keep a curved path the right width, but this only needs care. When the path has been set out on the ground, connect all the sticks on the right side of the path with string, and then connect those on the other side in a similar manner. Get a piece of sacking to kneel on and look at the path from near the ground level. Do you think it will do ? Are those corners too sharp ? Does it wind in and out enough or too much ? Go and look at it from the other end in the same way. You think it will do. Walk up and down it once or twice and imagine flowers growing on both sides of you. Do you think it will do now ?

An Experimental Path :—Yes, you think it will do, but perhaps it is the first curved path you have made, so naturally you are a little nervous. You would prefer to try it for a year before making it into a solid lasting path. Very well, there is no difficulty about that. The soil can be taken out to the depth of 2 ins. and furnace ashes laid down ; or it may be taken out to a depth of 6 ins. and filled in with 4 ins. of broken stone and 2 ins. of ash or grey gravel on the top. An experimental path is extremely useful and quite serviceable.

The Real Ash Path :—Next comes the important matter of making it properly, so that it will last for many years. For this purpose the soil should be dug out to the depth of 2 ft. and wheeled away. If it is of good quality it will be useful for potting purposes. Now obtain a quantity of rough rubble, such as broken bricks, stones, burrs, etc., and put 1 ft. of this material into the bottom of the path. On the top of this put about 9 ins. of smaller rubble, broken up if necessary with the coal hammer, so that no pieces measure more than 2-3 ins., and distribute it evenly over the whole surface of the path. Over this spread 3 ins. of furnace ash, which has been screened so that all pieces larger than a cubic inch have been removed. This should be spread evenly and then well watered and well rolled.

The ash may need renewing every two or three years, but the other part of the path will last for an indefinitely long period. Ash paths are very serviceable and harmonises well with flower borders.

The Gravel Path :—The gravel path is so much more often seen. The unsightliness of red gravel has already been pointed out. Grey gravel is the best to use, but pulverised limestone (sometimes sold as gravel) is quite useful and pleasing. The white "spar" found in Derbyshire is generally too glaring for use, and the yellow "spar" looks out of place.

The foundation of a gravel path should be the same as that of an ash path, namely, 12 ins. of rubble. There should be 6 ins. of smaller stone, 3 ins. of very coarse gravel, and 3 ins. of finer gravel. Roll well. The same proportions hold good for limestone chips paths.

Allied to the gravel path is the sand path. This is not a good path. It is made by putting 12 ins. of rubble and 3 ins. of finer stone into a trench 16 ins. deep, and covering with 1 in. of fine sand.

Asphalt, Concrete, and Cement Paths :—Asphalt and tar paths are ugly, and although serviceable and useful, they are expensive to lay. It is better to get proper

asphalters to lay them, and they should not be laid anywhere where they can be dispensed with.

Concrete and cement paths are also more serviceable than beautiful. They are extremely hard, and last for years.

Grass Paths:—Grass paths are the prettiest of all if the grass is kept well mown, but they are not at all serviceable. A single day's work may spoil them. If possible the soil should be taken out to the depth of 3 ft. and 1 ft. of rubble put in. Fill up with soil and lay the turf on it. Beat it firm. Barrows cannot be wheeled on grass paths in wet weather, and much treading on them in the winter will spoil them. If the barrow is left standing on them in wet weather it will make holes, and these and treading marks ruin the path. But in the summer they are a joy, and the green of the grass harmonises wonderfully with the flowers in the borders on both sides of it.

Flagged Paths:—In Chapter X, I referred to the use of flagged paths in the rock-garden. They are not difficult to make, but they require just a little care and patience.

The best materials are the thin flaggy limestones and sandstones found wherever carboniferous rocks occur. These flaggy stones are rough, angular, and irregular in shape and are far different from the flaggy sandstones used for edging purposes. The size of the stones used should depend on the size of the path and may be anything from 9 ins. to 2½ ft. long. Most of them are easily broken by three or four light blows with a coal hammer in the direction of the desired fracture.

The width of flagged paths may vary from 1-4 ft. They are specially suitable for the rock-garden, where narrow paths are permissible.

The construction of a flagged path is fairly simple. The soil is dug out to the depth of 6 ins., and the foundation beaten firm with the back of the spade. Three or 4 ins. of soil are then replaced and the blocks, which will be from 1-3 ins. thick, laid on it. In the case of a wide

path the outside stones are laid first and the centre ones afterwards. An eye for angles comes in useful here, for the stones should be well fitted together, so that each corner of one comes between two corners of another, and so on. It does not matter how angular or irregular the stones are, they will look natural enough when laid in the form of a path, especially after they have weathered a bit. The stones should be tapped after being laid, to make them firm. When the path is finished, some garden soil can be brushed along it to fill up the crevices and tiny alpine, such as Saxifrages, Sedums, and Antennaries can be grown in them if desired. Flagged paths last for years. To me, however, they appear only suitable for the rock-garden.

When the rock-garden is made on a bank the side paths joining the main path cannot be made without steps. A sloping flagged path looks very odd, but steps look quite natural. The steps should be roughly hewn rectangular stones not more than 9 ins. deep, and preferably only 6 ins. They may be set in one long "flight" or in groups of three or four, or each step may be separated from the other by a piece of level or very gently sloping flagged path. When possible, the steps should be made of the same stone as the flagged path, but this is not absolutely necessary so long as they are not of ugly material.

Garden Edgings :—To separate paths neatly from flower borders, edgings are essential, except in the case of grass and flagged paths. What is popularly known as a "live edging" (plants such as box, thrift, arabis, etc.) is sometimes entirely satisfactory, but more often it is disappointing. Thus we have to find a material which will last, will look neat, and will not detract from the beauty of the garden.

There are not a few such materials to choose from—flaggy "micaceous" sandstones, thin limestones, artificial edging tiles, wood edging boards and bricks, all of which may be used.

The best material is the thin flaggy micaceous sandstone, found in the rocks of the coal measure and millstone grit age, especially in the latter and the *lower* coal measures. It cuts into nice square or rectangular pieces, $\frac{1}{2}$ in. to 2 ins. thick, the best for the purpose being about 1 in. thick. Edging stones should be laid after a part of the second layer of the path (small rubble) has been thrown in. They should be sunk so that the tops will be two inches above the surface of the path, and made firm with soil on the border side and small rubble on the path side. It is important to get the edging stones the same height on both sides of the path throughout its length.

Sometimes edging stones are laid after the path has been made; the edges are then tidied up by adding a little fresh ash or gravel, and rolling well. Asphalt or concrete paths cannot well be made without an edging, so it should be in place before the men are sent for.

If sandstone is not available, then thin flaggy limestone may be used. It is laid in a similar manner to sandstone.

Edging tiles are next best. Bright red ones are unsuitable and so are those with moulded fancy tops. The best are the brown glazed plain topped tiles, made, I understand, of some kind of fire-clay. They can only be let into the ground a few inches, being narrower than ordinary edging stones.

After these comes wood. Wood is used in strips of varying length, which are sunk to the depth of several inches, leaving their tops 2 ins. above the surface of the path. It is most important to give them three coats of paint all over, otherwise they will not last. Boarding $\frac{3}{4}$ in. thick is suitable.

And now we come to bricks. Many amateurs would like to use these for edging, but usually they are quite unsuitable. There is something so very bald about a brick edging, it is inartistic, and often has a vulgar appearance. There are two ways of laying them, both of which

take a lot of bricks, but the first is the best. Take out a trench some 6-7 ins. deep, put in half a brick at one end, and then lay the other bricks on end at an angle. A little mortar may be used, but it is not really necessary. Finish up with a wedge, made by breaking a brick in two and then knocking off one of the corners. The second method is this: Take out a trench about 7 ins. deep, with a level bottom. Put a little mortar in, and lay a layer of bricks on their sides, if laid the usual way the edging is too massive. Above this put two more rows on their sides, beginning the second row with half a brick, and using mortar. The third row should be the same as the first row, beginning with a whole brick. Hard burnt bricks are essential for the purpose, softer ones are easily ruined by frost and weather. If the actual width of the bricks used is greater than $2\frac{1}{2}$ ins., the trench must be made a little deeper. The bricks should be sunk so that they protrude 2 ins. above the level of the path.

The Care of Paths:—Paths must be maintained in a good condition. Flagged paths, asphalt, tar, concrete, and cement paths need nothing beyond an occasional sweeping. But grass, gravel, and ash paths require timely care each season. Grass paths should be well rolled, and mown at least once a week throughout the summer. They should be hand weeded, and the verges kept clipped. Gravel paths should be well raked over after much wheeling of the barrow on them. They should then be well rolled, and not brushed more than is necessary. Ash paths should have any loose ash drawn into place with the back of the rake, and then be lightly sprayed with water, and well rolled.

Roll new gravel and ash paths at least once a week, after raking the surface. Keep them clean from weeds and from soil by well scraping the boots.

CHAPTER XVII.

WEEDS AND PESTS AND DISEASES.

GARDEN WEEDS.

"WHAT is a weed?" a beginner once asked me, and when I came to think of it there was some difficulty in saying quite what constitutes a weed.

As a general rule, however, all wild plants come under the heading of weeds, they are plants alien to cultivated gardens, for they appear and grow unbidden by the gardener.

This definition, however, is not quite correct, for a *Calendula* is not in itself a weed, but if it comes up unbidden in the *Godetia* bed, it has to be treated as one. Perhaps a really good definition of a weed is that it is a "plant in the wrong place." This is true for all sorts and conditions of "weeds."

I cannot help smiling when I recall a correspondence in a Yorkshire newspaper on weeds and the uses of weeds. It was extremely interesting, but not convincing, although I am willing to recognise that some weeds have uses. The weed question is always a serious one, the more so if strong measures are not taken both on the farm and in the garden to check their growth. It should be a national duty, instead of a voluntary labour.

An interesting experience seems worth recording here. Some few years ago a heap of rather poor soil was dug out in making a new greenhouse, and wheeled into a field adjoining our garden. Now it is completely covered with

weeds. The most plentiful is the coltsfoot. Next in order is the wild feverfew, then thistles, stinking groundsel, and twitch, besides others.

Some Garden Weeds :—One of the worst weeds to deal with is the *Dandelion*. It spreads extremely rapidly by seed, for a single plant can ripen thousands of seeds in one season, and the seeds are carried by the winds in all directions.

Another weed of remarkable vigour is the *Stinking Groundsel*, found wherever there is rough pasture. It varies in height from 6 ins. to 2½ ft. It grows rapidly in gardens and should be got rid of at an early stage. It produces quantities of seed which are blown all over the place.

The *Common Groundsel* is also a bad weed. Groundsel plants before they have seeded are useful for making vegetable humus (see Chapter XXVII).

Shepherd's Purse is another bad weed, which sends down a long tap-root, and is a weed of wide distribution and variable size. It seeds very rapidly, especially towards the end of the season, and, if left alone, will throw up flower stems 12 ins. long, and several to a plant. More frequently, however, it seeds in a dwarf state, throwing up only one stem.

We are not much troubled with either *Stinging Nettles* or *Dead Nettle* in this garden, but they spread rapidly in a light sandy soil. They are a sign, however, that the soil is fairly good.

Thistles are also very bad weeds, seeding rapidly. They usually indicate that the soil is poor, for they grow freely on waste land.

Charlock has yellow flowers and leaves somewhat like the turnip. It grows and spreads rapidly.

A weed which is remarkably difficult to eradicate is the *Climbing Bindweed*. It is a member of the convolvulus family, and spreads out a number of thin roots all of which will make new plants. The pink sort which is common in Pembrokeshire is indeed rather pretty, but

it is not a weed to be tolerated in the garden. Once established it may take years to eradicate.

Coltsfoot is a difficult weed to get rid of. Its leaves are large and angular. They are more or less white on the under side, and die off every winter. The root stock produces yellow flowers in the spring before the leaves appear. If the soil is dug up round these plants it will be seen that it is full of thickish white roots. These roots run along under the surface, often for a considerable distance, and reappear in new positions. If they are broken, every piece will grow and form a new plant.

The *Hawkweeds* are similar to the dandelion in flower and character. They also have a long tap-root, but are easier to remove than dandelions. They spread quickly.

The common *Feverfew* is not a pleasant weed to have. It is easy to remove in a young state, when it makes a good vegetable humus, but it rapidly grows into a small bush 1-2½ ft. high, which is covered in the summer with whitish flowers with a yellow centre. It requires some strength to pull up, for it usually has masses of fibrous roots, which, however, do not give rise to new plants. It seeds quickly. If the flowers are cut off, another crop will be produced in a few weeks. It is a perennial of some vigour, but it usually dies at the end of the third or fourth year. However, do not be softened by its rather pretty appearance, but have it up.

Dock grows chiefly on vacant ground, often associated with nettles. Nettles are more or less killed if cut down, but not so the dock. It possesses strong crowns and spreads by roots and seeds. If it gets into the flower garden it is extremely difficult to get out.

The common *Daisy* is a perennial. It spreads rapidly from seed which sow themselves all round the parent plant; it must be treated with promptitude. Young flowerless plants make very good vegetable humus.

Plantain is more common in lawns than in flower borders. In the former it must be spudded up with care.

It produces spikes in the summer and seeds readily. It has a mass of fibrous roots which grip the ground.

The *Buttercup* is another rather bad weed in the garden, spreading by its roots and seeds.

Grasses form a large group of garden weeds. The ordinary dwarf meadow grass is quite easy to deal with so long as it does not seed, and it forms valuable vegetable humus. But couch grass or twitch and many other of the rougher kinds of meadow grass are extremely bad weeds. Couch grass throws out long roots all round the crown or base of the plant. They spread very quickly. Each thin white root will make a plant and every piece will grow. It is frequently found round manure heaps, and if left to itself will drive a network of roots into the heap, and spoil the manure.

Chickweed is another bad weed, frequently growing on manure heaps. It spreads extremely rapidly, and in the flower garden grows close to the roots of perennials, where they are awkward to deal with.

With the chickweed may be mentioned the *Speedwell*, with its pretty little blue flowers. In habit it is similar to chickweed.

The wild red *Poppy* is a harmless weed so long as it is not allowed to seed. It makes good vegetable humus after the seed heads have been picked off.

A bad weed here is one known as the *Wild Vetch*. I am not sure if this is the correct name, but it is our Yorkshire name. The flowers are pea-shaped, small, and bright yellow. The leaves and stems are similar to those of the everlasting pea, only smaller. In the summer the plants are completely covered with bloom. Seed ripens very quickly. The pods burst and the seed is thrown about. If left to itself a regular tangle of growth results. It is impossible to pull up well established plants. The root stems are tough and wiry, and go down a long way, spreading out in the soil. New shoots come up from these, and spread again. It is only possible to eradicate it with much hard labour.

The *Wild Forget-me-not* is quite a harmless, pretty little blue flowered weed. It is easily got rid of. The danger lies in its seeds, so that the plants must be got up before they ripen. Flowerless plants make good vegetable humus.

There are a host of other weeds common to gardens. It is desirable to observe carefully the chief characteristics of all weeds and plants pulled up, and in the early part of the season care must be taken not to remove plants in the herbaceous border one does not recognise as weeds.

How to Keep Down Weeds :—The old proverb, "A stitch in time saves nine," may well be varied to read "A hoe in time saves ninety," so far as it applies to weeding. If once a crop of seeds is allowed to ripen and fall, there is nothing for it but to hoe the ground over throughout the whole season. But one single timely hoeing may save nearly all of this.

In a garden which has "gone to seed," it is always a long and hard fight to keep down the weeds which spring up on the ground. But there is absolutely no better way than repeated hoeing with a Dutch hoe. And hoe every day when by accident you have let any weeds seed. Never let the surface of the soil become solid, or they will soon spring up.

The weeds hoed up should be raked off at once. Those not possessed of tap-roots like the dandelion, or underground stems such as the coltsfoot, and those not in flower or seeding, may be used for making vegetable humus.

To keep down or kill weeds on ash or gravel paths, ordinary common salt may be lightly scattered over the surface; this should be done on a hot and dry summer day, and repeated a week later if needed.

Eradication of Weeds :—The eradication of weeds is a far more difficult task than merely keeping them down, and often involves a great deal of labour.

Take, for instance, the garden "gone to seed." The ground may have a few Lupins, Lychnises, Chrysanthemum maximum, and Michaelmas Daisies in it, but it is prac-

tically covered with such vicious weeds as dandelions, docks, coltsfoot, thistles, stinking groundsel, bindweed, feverfew, twitch, etc. It looks hopeless, but it is by no means so. My advice is to make an entirely new start, dig up everything in the borders and burn it, sacrifice the few perennials, for the roots of the weeds will be hopelessly matted in amongst their roots and would start to growing and spreading as soon as the perennials were replanted.

So dig the whole lot up, and entirely clear the surface of the border of any weeds. Make a fire and burn the lot, beginning with the drier foliage, and finishing with the roots and the soil adhering to them. The border should now be trenched 2 ft. deep if possible, in the manner described in Chapter XXIV, the soil being well broken up with a digging fork and every single bit of root picked out.

If the border cannot be trenched, then it must be dug with a deep spade (blade 12 ins. long). The displaced earth must be thoroughly broken up, stirred, etc., and all visible bits of root picked out.

A less laborious way is to well dig over the ground with a deep spade, and while digging and breaking up the soil to scatter fresh gaslime freely all over it. This powerful material is unsurpassed as a soil cleanser. It kills the roots of weeds, and grubs, and disease germs all at one time. But it should be applied to vacant land only, and nothing must be planted there for at least three whole months. The best time to apply it is in the very early winter, and not more than $\frac{1}{2}$ lb. per square yard should be used.

If, however, the case is not so bad and the ground not thickly covered or matted with such weeds, border plants need not usually be removed and destroyed. The fork and the spade are often quite sufficient to remove the weeds without making a great deal of disturbance. Generally speaking, the fork is more useful for the purpose than the spade. The spade is likely to cut through the roots, and leave a part of them in the ground. But a

strong digging fork with long thick prongs can be driven in, and by judicious prising practically the whole of the root of each plant will come up with the clod of soil. The soil can then be shaken off and the plant burnt. In the case of well-established deep-rooted weeds it is well to dig away some of the soil around them with the spade to the depth of a foot ; the fork can then be let in at the bottom, and will usually bring up a large piece of the root. Any that may then be left will be too deep to do harm, and will die.

In the flower garden there are cases where it is quite impossible to use the Dutch hoe for fear of injuring the border plants. Weeds have a way of growing very close to the stems of perennials, biennials, and annuals, and if allowed to remain they gradually stifle the plants and eventually kill them. To remove such weeds hand weeding is required, and, oh ! what labour it means ! Especially if the border is a large one. Bend down and grip the offending weed with the right hand, a slow and strong pull will usually bring it out with most of its roots ; a sudden jerk would only break a part of the plant off, and leave most of its roots in the soil. No tools can be used for the lifting of these weeds. It is not safe to use even the tiny weeding fork offered by nurserymen. The hands alone must be used to pull them up.

My lady readers must be warned that this kind of weeding usually leaves bad stains on the hands which may not wear off for some days, so it is well to wear an old pair of gloves.

As the weeds are pulled up they should be deposited in a pail or basket, and should never be left lying on the border to be collected or raked off at leisure. Unless this is done, many may be forgotten, and a shower of rain will start most of them growing again. The same thing applies to the hoeing of a very weedy border. The weeds should be raked off at once.

Disposal of Weeds :—All soft unseeding weeds and those which do not spread by tap or surface roots or creeping

stems, can be thrown into a pit to be made into vegetable humus. The others should be burnt.

Many beginners are apt to wait till they have a quantity of rubbish to get rid of and make one fire do for all. This is a very great mistake. Weeds have such hardy constitutions that they can ripen seeds on rubbish heaps, and these may be blown back again into the garden. It is of great importance to burn them at the earliest possible moment, and complete burning is, in the case of long rooted weeds, absolutely essential. The fire, however, should be a slow one, then the ash left will be of the greatest value.

GARDEN PESTS.

Garden Pests are of two kinds, live creatures and diseases. Here prevention is better than cure. Good cultivation, as that described in Chapter XXIV, is the best preventative; but there are cases where this is ineffective, and then war must be waged.

In a chapter of this kind it will not be possible to enter very fully into the matter. Several interesting works have been written on the subject, which is also dealt with in the smaller gardening dictionaries.

Soil Pests :—By far the most effective way of ridding the soil of live pests is by the use of gaslime. Its application has already been described earlier in this chapter.

But a less violent way is by using a mixture of two parts quicklime and one part salt at the rate of 4 ozs. per square yard, or by the use of fresh quicklime alone at the same rate. Opinions differ, but I would never let the quicklime lie on the surface of the ground for three or four weeks before digging it in as some writers advise. I prefer to dig the soil over, and while doing so to scatter it with ground quicklime.

At the present time there are a number of proprietary compounds known as "soil fumigants" on the market. I have tried very nearly all of them, and found them useful for the purpose of destroying soil pests. The directions

furnished with them vary to some extent, but generally it is advisable to use them in the top spit of the soil during winter digging.

Some gardeners prefer to make a soil fumigant of their own; and there is no reason why they should not do so, although the results may not be so good as those obtained by the application of a proprietary article. However, here is a formula of my own.

FORMULA: A GOOD SOIL FUMIGANT.

Fresh-burnt Quicklime (ground)	8 lbs.
Ordinary Common Salt	2 lbs.
Crude Naphthalene	1 lb.

Pound up the salt and the naphthalene separately; mix the salt with quicklime very thoroughly, and then mix in the naphthalene. This material must be stored in tins with tight-fitting lids. No naked lights should be near while pounding the naphthalene, as it is inflammable. The best time to apply it is in the winter during the digging. It should be scattered fairly freely over the surface of the soil, about a handful for every 2-3 yards of trench (top spit).

Carbolic acid, carbon bisulphide, and formaldehyde should not be used. They are expensive and extraordinarily powerful, not to say dangerous, and are better left alone altogether.

Some Garden Pests:—I propose now to mention a few of the pests which trouble the flower gardener.

Aphis.—These little creatures are found on rose shoots and on the growths of perennials in the summer. They are best killed by syringeing with a solution of quassia made as follows: To every half pound of quassia chips add half a pound of soft soap and ten gallons of water. Boil and strain. Use the liquid when cold.

Ants.—These are often troublesome. Mix a little arsenic with honey and put near their runs, they will be driven away or killed.

Centipedes are creatures said to have one hundred legs. They are small and difficult to see, usually a brownish colour. A soil fumigant is the best method of disposing of them.

Earwigs are often extremely troublesome, especially in the autumn. They get into the centres of large flowers and spoil or destroy them. There are many ways of destroying them, of which I give two. Cut some of the stems of old broad bean plants into 6-9 in. lengths, and lay them about the borders near the plants. Or put bits of twisted hay or even crumpled paper in small pots 2-3 ins. in diameter, and place them on the tops of the stakes used to support the plants. If no stakes are used, lay the pots down on the soil near the plants.

Go round and examine these traps every day with a pail of hot water with a little paraffin. Blow the pests out of the bean sticks, or shake them out of the hay or paper into the water.

Eelworms are small white creatures, most destructive to plants. The use of quicklime or a soil fumigant will kill them.

Forty-Legs or *Forty-Feet*.—These are dark brown coloured creatures about 1 in. long. They are very destructive, and can be cleared off the ground by applying a soil fumigant.

Green Fly.—This is the same as *Aphis*, which see.

Leather-Jackets.—These are small grey crawling creatures not half an inch long. They have a leathery appearance, and are remarkably hard to kill by hand. Some people use traps of turnip placed above the soil, but when they are moved the creatures frequently get away. I prefer a soil fumigant or gaslime.

Millepedes are similar to *Centipedes* and can be disposed of in the same way.

Moles.—These animals are often a great pest. They burrow a few inches below the surface, push up the earth, and injure roots. It is best to get a mole-catcher to trap them, but if such a man is not available, buy an iron

trap, or several if there are many runs. Never touch these traps with the naked hands, or you will catch no moles; always use gloves. Set the traps firmly in the runs, and remove at once as soon as they have "sprung."

Rats and Mice are great nuisances in the flower garden, but fortunately not common. They are caught in traps sold for the purpose, baited with meat or cheese.

Slugs and Snails.—These are some of the worst of the gardener's enemies. They eat off many choice plants at the ground line, and attack both young and old plants. These creatures have a huge appetite, and are difficult to find. Gardeners sometimes go slug-hunting at night with a lantern, but this is a laborious process. Choice plants can be protected by surrounding them with a circle of soot or quicklime, and renewing it frequently; or a ring of zinc can be put round very small plants. The patent slug-traps now offered by nurserymen act well. The slugs caught in traps are best disposed of by turning them out into a pail of hot salt water. Ground can be cleared of slugs and snails to a large extent by liming it well, or by applying a soil fumigant. Gaslime is unnecessary.

Thrips.—Flowers out of doors are sometimes attacked by a small insect known as Thrips. A syringeing with an emulsion made as follows is a cure: Boil two pounds of soft soap in water, and while hot stir in about 1 pint of paraffin oil. Dilute slowly until a total quantity of 12 gallons is obtained. This liquid will keep.

Wasps are sometimes a nuisance in the flower garden. They may be killed singly by using a "fly-bat." But it is best to trap them by placing jars containing old beer or a strong sugar solution in amongst the plants. These can be inverted in pails of water to destroy them.

Wireworm.—This is one of the worst soil pests the gardener has to fight. It is a yellow grub about one inch long, and feeds on plants under the soil. Gaslime is the best material to use, ordinary soil fumigants are not always effective. Traps made by sticking a small piece

of wood through half a potato or turnip, and placing them just under the soil near the plants are effective. The grubs found underneath them each day should be nipped in two or dropped into boiling water.

Earth-worm not a Pest.—While speaking of soil pests it will be well for me to say a word or two about the earth-worm, a creature so many amateurs regard as an enemy. The earth-worm is really one of the gardener's very best friends, it is a gardener too, for it helps greatly in the cultivation of the soil. Worm "casts" are very rich material. Earth-worms should be encouraged, it is a sin to kill them. Some people say that if a worm is cut in two, the parts will join up again, or that each part will turn into a new worm. Unfortunately this is not true. Worms are never found in very poor soils, but in rich material, old hot-bed manure is full of them. A poor soil is thus doubly benefited by dressing it with old manure, by the food in the manure itself, and by the good work the worms will do.

PLANT DISEASES.

As a general rule good cultivation is the antidote of plant diseases. Good cultivation keeps plants in a robust condition. They are then better able to withstand diseases, the germs of which may always be lurking in the soil or air. Most of these diseases are attributable to some form of more or less minute fungus, growing as parasites on or in the tissues of the plants. Bordeaux Mixture is an effective spray in many such cases.

Chrysanthemum Rust.—It is best to pull off any leaves which are affected by this disease and burn them. As a preventative of further trouble, spray the plants with a solution of sulphide of potassium, one ounce to 3-4 gallons of water.

Hollyhock Disease.—This will quickly ruin a whole batch of plants. It begins by affecting the leaves at the base, and then goes upwards. There are several prepara-

tions offered to cure it, but none better than Bordeaux Mixture.

Mildew.—This affects many plants which are "below par." Flowers of sulphur is one of the remedies. The affected plants (roses, chrysanthemums, etc.) should be dusted over with it, and the affected leaves may be picked off and burnt. Another way is to spray them with a solution of one ounce of potassium sulphide dissolved in two or three gallons of water.

It is well to keep a watchful eye on roses, chrysanthemums, and hollyhocks for the appearance of any of these diseases. As soon as they appear apply the remedies. Do not wait till the plants become badly affected, or they may all be ruined.

If by accident a plant does get very badly affected, do not hesitate to pull it up and burn it at once to prevent the disease spreading.

CHAPTER XVIII.

WATERING.

It is not without some misgivings that I take up my pen to write a chapter on this important subject. There are many theories, indeed every experienced gardener has his own ideas on the subject of watering, and so far as experiments go these theories have all of them some practical value. The object of watering is to give water to thirsty plants. Some say that "a plant cannot get the greatest benefit from watering unless the water is applied to its foliage as well as to its roots." Others that "the sun must be shining to enable a plant to derive benefit from combined foliage and root watering"; that "it is extremely dangerous to apply water to the foliage of plants at all when the sun is shining"; that "plants should only be watered in the early morning"; that "plants should only be watered in the evening"; that "rain water alone should be used"; and that "tap water alone should be used."

The subject is full of, nay, overflowing with pet theories. A simple subject is made unnecessarily complex, and the amateur is so much perplexed. We must respect the work of others, if we do not agree with it, and perhaps it will be best if I give a few of the results of my own work.

For several years small experiments have been carried out in my own garden with the following results:—

The Time to Apply:—My experiments have repeatedly shown that it is harmful to water plants when the sun is shining brightly. This is true both as regards watering

the foliage and at the roots, but the results obtained show that much less harm is done by watering at the root at such a time than on the foliage.

Combined watering (foliage and root) has been done in the early morning, and in the evening, when there was little strong sun. Careful observation showed that the advantages of early morning watering were extremely great, especially in the case of sweet peas. On the other hand, I failed to detect any difference at all in the case of some strong perennials such as *Chrysanthemum maximum*. It did not seem to matter the slightest whether they were watered in the early morning or evening. Both sets of plants did equally well.

I have proved beyond doubt that the sprinkling of the foliage of plants with water during hot sunshine is dangerous. It usually results in the leaves being badly burnt, perhaps because the drops of water condense the rays of the sun. Sprinkling is useful for freshening up the foliage of border plants after a hot day, but it does not make them less thirsty. It is usually done with a small syringe or very fine nosed can, and the plants benefit by it if they are not dry at the root.

The Amount to Give :—Various experiments have been made as to the amount of water to give. In most cases the soil was allowed to become so dry that the plants began to flag before any water was applied. The trials were rather interesting. In the case of perennials or deep-rooting annuals, it was not enough to soak the soil to the depth of 6 ins., and a soaking to the depth of 2-3 ins. was practically useless. Perennials and deep-rooted plants require the soil to be soaked at least a foot deep, but for most bedding plants a depth of 6 or 7 ins. proved sufficient. A soaking meant application of water until the soil was thoroughly wetted throughout, but not so wet that it turned into a puddle.

For very big perennials a soaking to the depth of 1 ft. was not enough. Sometimes it was necessary to soak to the depth of 18 ins. But when that depth was reached,

the soil, which had been well prepared, was usually quite damp of itself.

Large clumps of perennials had 3-4 gallons of water poured into them gradually. Small clumps had less in proportion, and summer beds with dwarf surface-rooted annuals, etc., had less still for a given area.

The Water itself :—Experiments have shown that rain water is not, in our district (coal measures and millstone grit), necessary for watering. Tap water is largely used, but this is soft. In districts where the water is very hard, it is not over suitable for watering. Other experiments than mine have shown this. But hard water can usually be improved by allowing it to stand in large open tanks, and it can be softened by introducing a certain amount of lime. The local water authorities will say how much bicarbonate of lime per 1,000 gallons their water contains, and the local chemist should be able to calculate the amount of slaked lime required to make it soft.

If the amateur has tanks at his disposal he should let them stand full of tap water, for even if soft it is improved by exposure to the air. Its temperature then more nearly agrees with the temperature of the soil. However, so far as I have gone I have never noticed that water drawn straight from the mains is harmful. I do not think this has ever been shown to be the case, except, of course, for indoor plants, and especially those grown in hot-houses. Such plants must be given water of a similar temperature to that of the house, otherwise they may be badly injured.

The Hose Pipe :—A hose pipe is of untold value, and with it there is no excuse for underwatering the plants. Using a hose pipe is quite one of the gardener's jolliest experiences. Really, two people are required to do it properly, one to fag, while the other holds the pipe.

The hose pipe is an extremely useful appliance, but it needs using carefully. If the nozzle has not a rose on it, the second finger of the left hand may be put at one side of the jet of water to turn it into a light spray. Extra

thoroughness is needed in using a hose pipe. The soil may look wet, but scrape down a few inches and it may be as dry as a bone. It is necessary to go over the garden at least twice to ensure a proper soaking. The bare nozzle should be used for the watering of such perennials as Lupins, Pæonies, Delphiniums, etc., which have grown into large clumps. But the pressure of water in such cases should be considerably reduced by turning the tap, or much soil will be thrown about and the roots exposed.

The Watering Can :—If the gardener has no hose pipe, he must rely solely on the watering can. There are various makes. Even a small garden should have at least three cans.

Their capacity is a matter for careful consideration. Those holding 2 gallons each are convenient, but a fairly strong man will be able to carry a couple of cans with a total capacity of 6 or 7 gallons. There should be one can holding a single gallon; this is light for his "better half," and may also be used as a measure for mixing liquid manure.

I advise two "roses" for each can, a coarse one and a fine one. This is not extravagant, and many cans have a ring soldered on to one side of them, upon which the extra rose can be screwed.

Certainly one of the six roses should be very fine indeed, that is, the holes in it should be very small. Such a rose is extremely useful for sprinkling. The coarse roses are used for watering established annuals which have grown to a fair size, and for small clumps of perennials. The fine roses should be used for seedling annuals which have just been planted out or are just coming up in the seed bed; if a coarse rose were used many of them would be drowned, washed out of the soil, or broken down.

A rosed can is of no use for watering big clumps of perennials. To do this effectively, remove the rose and pour the water into the centre of the clump from the spout; it should not wash soil off the roots if done very carefully.

The Soil and Watering :—The nature of the soil is an important consideration in watering, and although I deal with the subject of Soils and their Management in a separate chapter, I must say a few words about them here.

It is well known that sandy soils dry up the quickest of all soils, and that clay soils dry up a great deal slower. But it is not always recognised that sandy soils are the easiest to thoroughly moisten again if they get dry, and that clay soils are very hard to moisten when once they become solid and dry. Not only does the surface of the soil become caked, but it also becomes cracked and air is let into the roots of the plants, which is an additional danger. When a clay soil is allowed to become dry and caked, simple watering is of no good. The Canterbury hoe and the digging fork must be used, and the surface "chopped, prodded, and turned." This must be done with great care, otherwise some of the roots of the plants may also be "chopped, prodded, and turned." The soil should only be broken into small lumps, not completely broken up. The water-pot may then be applied, and the water will very slowly soak in. It is necessary to give two or three doses to ensure a proper soaking.

The way, however, to avoid the possibility of such a tragedy, is to improve the soil in one of the ways outlined in Chapter XXIV.

On account of its ready drainage a sandy soil usually has to be watered much earlier in the summer than is necessary with a clay soil, or good strong loam. And the watering has to be continued longer in the season. Sandy soils, however, are capable of being well strengthened as described in Chapter XXIV.

The Main Points :—The main points to be remembered are :—

The time to apply—Early morning, or evening, when the sun is not powerful.

The amount to apply—Varies considerably with the nature of the plants. But give a good soaking. Not a little to-day and a little more to-morrow.

The water itself—Rain water is not essential. Soft tap water can be used.

How to apply—Use a hose pipe when you can, and a watering can if you have no hose. Never throw water on to the garden from a bucket.

The soil—See that a clay soil is in a fit state to absorb water before applying it. Most of it will run off a hard baked soil, and that which runs into the cracks will do little good.

Lastly—Never use soapy water for watering unestablished plants. It is liable to kill them.

Indoor Watering:—Indoor watering is required for plants in frames, and in the greenhouse, or home. Frame plants usually require little water from October to March. Bulbs and plants grown in hot rooms require a good deal. When given at all, give a good soaking, dribblets never pay. To see whether such plants require water, tap the sides of their pots with a small wooden hammer. If there is a clear hollow ringing sound, water is required.

CHAPTER XIX.

SUMMER FEEDING.

THE question of summer feeding is one upon which opinions differ. It is a subject very full of interest, but one in which if mistakes are made disasters are likely to occur.

First of all let me ask, "Is Feeding Necessary?" Amateurs seldom take the trouble to ask themselves this very important question. They take for granted that feeding is necessary, and feed without thought.

In some gardens and allotments the plants are much overfed. One sees a barrel containing liquid manure made from horse or cow dung, and soot, often as black as ink, and it is quite usual to see amateurs feeding their annuals, biennials, and perennials with this powerful fluid. They say that their plants won't grow without it.

"Have you tried, then?" I ask. "Well, no," or perhaps, "Yes, many years back when we first took over this piece, but we never had a worse lot of flowers."

"How about the manure you put in every season?" I ask. "Do you put a good, thick layer in each trench?"

"Well, no, we hardly do that," is the answer. "We just put a bit in each trench as we go on, but would rather feed the plants during their season of growth than waste a lot of manure by putting it in each winter."

That is not an uncommon idea. And it is largely held by amateur gardeners, who prefer to rely on summer feeding rather than on good cultivation and winter manuring.

This is all a mistake. If manures can be obtained or made as described in the chapters to follow on Manures,

they should be used for winter digging, and with ordinary plants summer feeding will not be in the least necessary. It may be practised, and the results may not be amiss, but it is not necessary for an average amount of growth and bloom.

If manure cannot be obtained in any form at the time of winter digging, then summer feeding may become necessary. Or if giant "specimens" are wanted, summer feeding is necessary in addition to winter manuring. It is for this reason that I deal with summer feeding here in a separate chapter.

There are cases where summer feeding is extremely harmful, and one of these is when the soil is sour and acid. It is also very harmful when the soil contains a great deal of animal or vegetable manure near the surface. In this case it turns the soil sour; and in the former case it increases its acidity, poisoning the ground to plant life.

It is well to think of the powerful properties of the liquids used for summer feeding. Liquid manures are so easily absorbed by plants, that they have the power to poison the plant as well as the soil, and this is often what takes place. Like strong drugs in the case of human beings, liquid foods are good for plants in small or weak doses, but poisonous in large or strong ones.

The Characteristics of Foods :—Summer feeding can be done with liquid animal manure or with artificial manure. Success has attended the alternate use of both, giving one this week and the other next, and so on. The characteristics of these foods differ. Liquid manure made from horse, cow, pig, or sheep dung, and soot, is, generally speaking, a universal food; that is, it produces both leaf and flower. And the same may be said of proprietary fertilisers. But it is different with simple chemicals such as nitrate of soda, superphosphate of lime, etc. Nitrate of soda used alone tends to produce leaves; superphosphate to produce flowers or blooms of larger size. The use of artificial manure is, however, more fully discussed in a later chapter.

How to Make Liquid Manure :—There are many ways of making liquid manure, and I give two of them here. Obtain a large barrel—a beer barrel or a paraffin cask answers very well. Light a little fire in it, and when the wood is beginning to crackle, turn the barrel over in order to exclude air, and the fire will go out. Then put about a peck of fresh horse, cow, or sheep dung, or old pig manure into the barrel, and half fill it with water. Add a quarter of a peck of soot, stirring it in, and then fill up the barrel with water. For three or four days the mixture should be frequently stirred. The liquid is then drawn off for use.

The second method is rather less messy. Get an old sack and put inside it a mixture of one peck manure and about a quarter peck of soot. Tie the sack up, and suspend it in the barrel of water from a stake laid across the barrel. Allow to stand several days, stirring meanwhile, then draw off for use.

The liquid drawn off in both cases will be very strong, and probably of inky blackness. That made by the second method will usually be the weaker of the two. But in any case it is necessary to dilute the mixture very considerably before applying it. A small jar holding about a pint should be used. Usually one of these pots full will be quite enough for a gallon of water, if not too much. The general rule is to dilute until a nearly clear solution is obtained. A gardener once told me he diluted his till it looked "almost like weak tea," and so weak that he "would scarce mind to drink it" himself.

Feeding : Some Practical Points :—You have now a can of diluted liquid manure ready for use. Well now, we will go to the flower border together. We find the soil is dry. Shall we apply the food at once? No, certainly not, or the roots of the plants may be injured. In such a case first give the plants a good watering with clear water.

After half an hour or so the liquid manure may be applied. The amount (about 1 gallon) can be distributed

over 2-3 square yards or more of soil. It is well to begin with a little and give more as the weeks go on.

A question of importance is when to begin to apply. In any case do not begin until some flower buds show, and with "specimen" plants of hardy annuals it is specially important to get them thoroughly strong and established first. Begin by feeding once a week, and increase it to three times a week, but not oftener than that. The feeding of perennials is rather easier. It can be started as soon as the first bud or spike appears, for most of the perennials described in Chapter VII are of strong constitutions, and not so easily injured by the application of food. Generally speaking, June is the month to begin with perennials, and July with annuals; in each case the feeding once commenced can be continued right through the summer months.

Such early-flowering perennials as Lupins, Pyrethrums, and *Doronicums*, which are in flower in May, may be fed then, and if the feed is increased in strength after the flowers are over, and the dead spikes or blooms removed, a second crop of bloom will often be given about a month or so later. The same thing applies to a less extent with early-flowering annuals.

With late blooming annuals such as Sunflowers, *Statice sinuata*, and *Lavatera*, July is too soon to start feeding. These rarely show flower before August, so feeding should not be commenced till the first week of that month.

Canterbury Bells and other biennials may be fed while in flower, but it is usual not to commence feeding till they have been cut down after their first flowering period. A second crop is then given later on. The same applies to the well-known hardy perennial *Anchusa*, and to the early-flowering dwarfed *Delphiniums*.

The best period of the day to give the liquid foods is a matter of opinion, but it is inadvisable to do so during hot sunshine.

Excellent results may be obtained by watering with clear water one night, and feeding the next morning

early, between 6 and 7 o'clock. Experiments have shown that the early morning is a good time to feed. But if the amateur gardener waters and feeds in the evening when the sun is low he will be well rewarded.

Liquid manure should be kept off the foliage of the plants as much as possible. It is practically impossible to feed all the plants in a flower border without splashing some of the liquid on to the leaves. If left to dry on, it may burn the foliage, but it is easily got off by lightly spraying with clear water from a syringe.

The subject of the use of artificial manures for summer feeding is reserved for Chapter XXVI.

CHAPTER XX.

CUT FLOWERS.

A PRETTY story was once told me about a little girl who had a tiny garden of her own and worked in it entirely by herself. She grew many kinds of flowers, but at the time of the story she had only a very few roses in bloom. She must have been a remarkably kind-hearted child to do what she did. A clergyman called at the house and she showed him her garden. While he was talking to her he mentioned that a certain widow was feeling very miserable and was in great trouble. She had just lost her son. The little girl went to the house next day and gave the woman the few precious roses grown in her little garden. When the clergyman called at the child's home again, he sent for her. "You did so cheer Mrs. B—— the other day," he said. "She is quite different now." "But it wasn't me that did it at all," protested the child. "She wouldn't say anything to me, so I just pushed the flowers into her hand and ran off. Why!" she cried, her eyes dancing, "it *must* have been the flowers that did it."

This illustrates very well what flowers can do. We all want cheering up sometimes, and naturally we want to cheer up our fellow-creatures, especially at the time I am writing, those in hospital. There is nothing that cheers better than a bunch of flowers, and though it is not a costly gift, it speaks of thought and sympathy, both of which are valued by hospital inmates.

Some people are apt to be selfish with their flowers. They say they have grown them to deck the borders and

not to give away. "Look at the labour I've put into that border!" they say. "If I cut the flowers it will spoil the border, and I shall have nothing to show for all my work! No, my idea is if you cultivate flowers, let them stay on the plants; I won't have any plucking, or cutting, or clipping them off."

But surely this is a case of unnecessary selfishness. A man of that type who will not have flowers cut for other people, usually will not let any be cut for himself. His house has a strange, bare look about it. You can hardly tell he is a gardener, unless you see some gardening books or horticultural papers on his table.

"Is not a garden a place for flowers?" he will ask me. "Have you not said so yourself in the first chapter of your book? Then let a garden be a place for flowers; let it be *the* place for flowers, and not go spoiling plants by cutting flowers, and spoiling flowers by sticking them into pots in the house, or giving them away to be stuck in jugs."

I have come into contact with many such people; and I am happy to say that I have been able to convince them that there is another side to the question, and have induced them to modify their opinions.

A fact which some do not recognise is that it is possible to have flowers in the home, as well as a surplus to give away, without robbing the garden seriously. This is true in all cases where there is an annual, mixed, or perennial border of any size. If there are rose-beds as well, flowers should be abundant.

The garden may, in some cases, be bare for a day or two after a large quantity of flowers have been cut, but very soon it will be gay again, and the flowers may indeed be better even than those out previously.

Later on I give two lists of plants the flowers of which are valuable for cutting. Generally speaking the more you cut from most of the plants in these lists the more you get. So far as my experience in gardening goes I have found that plants are very generous beings. They

will only offer you a few flowers if you do not take them, but many if you do.

To take one excellent example only. A large plant of *Calendula grandiflora* (described in Chapter IV) will only give about ten good blooms if the flowers are not cut and the seed is allowed to ripen. If, however, the blooms are cut as soon as they are open, the plant will produce fifty fine blooms, and probably more. All plants will give more flowers if cut carefully, and if treated generously.

Generous treatment has already been discussed in previous chapters. With "specimen" plants especially it is impossible to hope for success unless the soil itself is made rich. And gardeners who want a great many flowers from their plants should not stint manure in the winter if the soil be poor.

Careful Cutting :—That the method of cutting affects the amount of bloom a plant will produce must be evident after a little consideration. The "plucking" of flowers, alas! so common in the gardens, should never be practised for the reason that when a flower is "plucked" it is pulled more or less roughly off the plant; the plant is often considerably loosened in the ground; shoots are pulled off by mistake, shoots carrying no flower buds perhaps, but which would produce a wealth of bloom in due course. The shape and habit of the plant are also frequently disfigured.

It is well to point out that flowers for the home or hospital should be *cut* and not "plucked or pulled," and children especially should be taught to respect the flowers growing in the garden, and be shown how to gather them properly.

I knew of one gentleman who would never allow flowers to be cut except with a pair of secateurs. He said that these are *the* tool to use, for the flowers are removed with the minimum of injury to the plants. I quite agree with him. A pair of good, sharp secateurs are undoubtedly the best tool to use, but I would not go so far as he and say,

"Use no other tool." A sharp pair of ordinary scissors are very good, but if these are not available, then a sharp knife may be used. A blunt knife is almost as bad as "plucking" the flowers, the damage caused being frequently no less. The knife or scissors should be kept cleaned, and should be frequently sharpened with one of the patent kinds of "stone" offered by ironmongers.

The Art of Cutting Flowers :—It makes no difference to the plant *when* its flowers are cut, but it makes a very great difference to the lives of the flowers themselves. Opinions differ as to what is the best time to cut them, and experiments are difficult to carry out, for the results are affected by many small points, such for instance as the temperature of the room and the position of vases of flowers. But at any rate never cut flowers during hot sunshine. The best times for doing the work are in the early morning or in the evening. Trials point to the advantage arising from early morning gathering, but if the plants are well watered in the early morning, and the blooms cut in the evening of the same day, very little difference in their lasting period is noticeable.

The cutting of flowers is an art in itself, and like most arts it takes some trouble and study to learn. By indiscriminate cutting it is possible to ruin the whole of a beautiful coloured picture, but with care all the flowers wanted can usually be got without spoiling the beauty of a border.

To do this is easier than it sounds. Let the reader go out into the garden with me, and we will have a look at the border and see how it can be done. We look at plants such as *Erigerons*, *Chrysanthemum maximum*, and many others, and we may find that these are at present covered with bloom. The colour effect of the whole border is good.

The art of flower cutting consists in taking a few flowers only from each clump. In a big border there will be five or six clumps of each plant, and instead of spoiling one clump by removing all its flowers, we spoil none by taking

a few from each. In this simple way the colour scheme of the border is not spoilt. One usually cuts blooms or spikes from the outside of the plant so that the size of a given patch of colour is reduced a little, and not done away with completely.

If, however, a very large quantity of flowers in variety is wanted, do not hesitate to cut the whole lot on each plant in the colour border; for in a few days the border will be a lovely colour picture once more. But beware of leaving two or three stray blooms on each clump "for grace" as the expression is. Better have them all off, for then all new blooms thrown up will be of a more or less uniform height.

Vases and Greenery:—When the flowers have been cut it is well to put them in water at once, and the vases or bowls should be appropriate in size and shape to the various flowers.

For instance, long spikes of lupins look ridiculous as well as ugly if put into tiny vases, or jars three or four inches high. They want tall, rather substantial vases, so that their stems can be let into the water at least 6 ins. On the other hand, roses and other short-stemmed flowers look equally out of place in tall vases 12–18 ins. high. They look "lost" as a friend once said to me. Short-stemmed large blooming flowers look best in dwarf vases, or better still in shallow flower bowls.

Some gardeners have a taste for putting a green foliage amongst the flowers for use in vases in the home, or they deck up a bunch of flowers to be given away, with a similar lot of foliage. For my own part I am not so keen on greenery. "A bit of green" is all right, indeed it sometimes looks very well. But I am a great believer in the flowers themselves, unadorned, or rather shall I say ungarnished. To my mind greenery detracts considerably from the pure loveliness and simplicity of individual flowers, and nothing I think looks so unnatural as flowers practically smothered in a vase with greenery. I always ask, "Are not flowers beautiful enough alone?" I

think they are, though there are times when their appearance is enhanced by a little green, so long as it is only a little.

How to Keep Flowers Fresh :—At the beginning of the season, and at its end when flowers are scarce, people are often worried by the shortness of the period they last in water. There have been of late many ingenious suggestions made for prolonging this period, and doubtless there will be many more as time passes. One is rather dubious about some which are said to have been highly successful, and until I can speak definitely I prefer not to describe them. There are, however, some good old methods well enough known to experienced gardeners, but unknown to many amateurs.

One of the best of these methods of prolonging the life of cut flowers is to put a pinch of common salt or a tiny crystal of permanganate of potash into each pint of water. Some gardeners use an artificial manure, but unless this dissolves completely in the water its use is objectionable, for it gives the water a dirty appearance. There are, however, some completely soluble proprietary fertilisers to be had, and they can be tried. A small pinch in each pint of water is usually quite enough.

Another recipe is specially useful for roses. Put 16 drops of glycerine into a gallon of water and stir well. Then put in the roses.

Some flowers discolour the water they are placed in. This is considerably reduced if a piece of charcoal is dropped to the bottom of each vase.

The colour of flowers in water may be maintained or intensified by the use of sulphate of iron. A small crystal dropped into each vase, but not more than $\frac{1}{8}$ of an ounce in every gallon of water. The use of this chemical for the same purpose for plants growing in the garden is described in Chapter XXVI.

There are also some other little hints which do not necessitate the use of chemicals.

When cutting a flower, cut the stem straight across in

order to expose the least possible area to the air. When, however, you get the flowers indoors, cut the stems slantwise in order to expose the greatest possible area to the water. This is important. Flowers with hard stems do not suck up the water readily, but this method of cutting helps them a great deal. Also in the case of very thick stems, slit them up an inch or so, with a sharp, clean knife, making two or three slits on each stem. Then put at once in water.

The use of very cold or very hard, or of filtered water is undesirable, and hot water, or water that has been boiled, must never be used. Soft water is best, and when the flowers are put in, it should be warmed until it is a few degrees below the temperature of the room in which the vases are to stand. It is also a matter of some importance to change the water frequently. This should be done every day unless permanganate of potash or charcoal are used, when once in two or three days may be enough. The life of a flower is seriously affected by being stood in semi-putrid water, and nothing looks worse on the table than a big glass vase full of bad water.

At the same time as the water is changed the stems of the flowers can be shortened a little, $\frac{1}{4}$ of an inch up to $1\frac{1}{2}$ in. being cut off, according to the kind of stem. Small soft stems will do with very little cutting, indeed the flowers often last well enough without it, but big woody stems require much more. The use of this cutting is to expose fresh portions to the water, and to enable the flower to drink with renewed vigour.

Mistakes to Avoid :—It is a mistake to stand vases of flowers in sunny windows, or on the mantelpiece when a fire is burning. Flowers will not last long in these positions. Also it is a mistake to stand vases of the more delicate annuals in a draught. Somehow or other the flowers get "chilled" and do not last nearly so long as they might do.

Another mistake is to put too many flowers into a single vase. Apart from the ugly appearance, it reduces the length of their lives. It is easy to see the reason. A

big bunch crowded into a small vase means that the stems are very close together. They cannot each get their proper amount of water, and some of them will get no water at all. It is thus not surprising that they soon die. For my own part I do not care to see a vase "full" of flowers, and what I call full is what some consider only "half full." I think plenty of vases and a few flowers in each look infinitely more beautiful than a crowd of blooms jostling each other. If only a few are used the individual charm of each bloom or spike of bloom is shown off to the best advantage.

And now just a word or two about clashing colours. The reader is recommended to educate himself in the manner described in Chapter VIII. He should never arrange his flowers without seeing that the colours do not clash. For instance, he should never put Golden Yellow and Violet in a vase with Red, for although the first two harmonise with each other, they both clash with the third.

A Word about Poppies :—I must say a word about Poppies, which are so much prized for cutting. Usually they will not last a day unless treated in some way. Shirley Poppies look extremely graceful in water, but the other kinds, annual and perennial, may be used. A way of increasing their life is to cut them when just out, and to put the stems into a burning gas jet until the ends are sealed up before putting them in water. But even then they hardly last longer than a day. Other methods were discussed in a leading gardening paper during the summer of 1915, but I have not space to quote them here.

Flowers for Cutting :—I now give two lists, the first of annuals, and the second of perennials, which are good and useful for cutting. They do not all respond to the "cut and come again" practice referred to earlier in this chapter, but a good many of them do. It is well to say that most of the biennials described in Chapter V can be used for cutting, but as there are so few of these, it is hardly worth while to make a separate list. The reader

will find that many, but not all, of the plants in the following lists, have been described in the early chapters of this book. Their culture, however, is similar to that generally outlined in Chapters III and VI.

LIST OF ANNUALS FOR CUTTING.

- Acroclinium album* and *roseum*, 1 ft.
Ageratum mexicanum, 1 ft.
Agrostemma Coeli, etc., 1 ft.
Antirrhinum majus and intermediate varieties, 2 ft., 1½ ft.
Arctotis grandis, 2 ft.
Asters (all half-hardy sorts), ¾ ft. to 2½ ft.
Cacalia coccinea, 1½ ft.
Calendula (all varieties previously described), 1-1½ ft.
Calliopsis bicolor and *hybrida*, etc., 1-2 ft.
Candytuft (most varieties), ½-1 ft.
Centaurea Imperialis, *Margarita*, etc., 3 ft. and 2 ft.
Chrysanthemum tricolor and varieties, 1½-2 ft.
Chrysanthemum Dunnetti and *Segetum*, 1½-2 ft.
Clarkia (all varieties described in Chapter IV), 1-2 ft.
Convolvulus minor, 1-2 ft.
Coreopsis coronata, *Atkinsonii*, etc., 1½-3 ft.
Cosmea, white, 1½ ft.
Cosmidium (similar to *Coreopsis*), 1½ ft.
Cyanus minor (*Cornflower*), 2 ft.
Delphinium, *Blue Butterfly*, 1½ ft.
Dimorphotheca hybrida, 1½ ft.
Eschscholzia (most sorts excepting dwarf ones), 1 ft.
Flos Adonis, *Dark Crimson*, 1 ft.
Gaillardia picta *Lorenziana*, 1 ft.
Gaura Lindheimeri, 2 ft.
Godetia (the taller varieties previously described), 1½-3 ft.
Gypsophila elegans, 1½ ft.
Helichrysum nanum and *monstrosum*, 1½ ft. and 2½ ft.
Larkspur, *stock-flowered*, etc., 1-2 ft.
Lavatera Splendens, *rosea*, and *alba*, 3 ft.
Linum grandiflorum rubrum, 1½ ft.

- Lupinus Hartwegii* and *tricolor*, 2 ft.
Malope grandiflora, *rosea*, and *alba*, 2 ft.
 Marigold, African, and tall French, 2 ft. and 1½ ft.
Matthiola Bicornis, 1 ft.
Mignonette (all varieties can be used), $\frac{3}{4}$ –1½ ft.
Nemophila (varieties described in Chapter IV), ½ ft.
Nigella hispanica atropurpurea Miss Jekyll, 1–1½ ft.
Phlox Drummondii *Grandiflora*, 1 ft.
 Poppy (all mentioned in Chapter IV can be used), 2–2½ ft.
Rhodanthe maculata, 1 ft.
Rudbeckia amplexicaulis and *bicolor*, 2 ft.
Saponaria Vaccaria rosea, 2 ft.
Statice sinuata, etc., 1 ft.
 Stock (*Matthiola*). All kinds of stocks may be used for cutting. For lengthy lists of named sorts, see trade lists. ½–1½ ft.
 Sunflower, dwarf single and dwarf double, 3 ft.
 Sunflower, *cucumerfolius*, 3 ft., New Dwarf Compact, 1½ ft.
 Sweet Peas. All varieties of these are grand for cutting.
 Sweet Sultan, all varieties, 2–3 ft.
Xeranthemum imperialis, 1½ ft. Double rose, 1 ft.
 Zinnia Giant Double, Double Dwarf and Single Mixed, 1½–2½ ft.

LIST OF PERENNIALS FOR CUTTING.

- Achillea Ptarmica* The Pearl, 2–3 ft., and Perry's White ; also *A. alpina*, 2 ft., and *A. eupatoria*, 3 ft.
Aconitum (all varieties described in Chapter VII), 2–6 ft.
Anchusa (not very suitable but can be used). Dropmore and Opal are the varieties, 3–5 ft.
Anemone japonica alba, and *rosea*, 2–3 ft.
Anthemis tinctoria E. C. Buxton, 2 ft.
Aquilegia (all varieties described in Chapter VII), 1–3 ft.
 Aster (Perennial or *Michaelmas Daisies*). All the varieties of these described in Chapter VII are suitable, also many other sorts.
Campanula glomerata, and *grandis*, *persicifolia*, and *trachelium* are more or less suitable, 1–3 ft.

Carnation (most varieties of this are very suitable).

Chrysanthemum. All early-flowering border varieties are suitable. Height varies considerably from 1-5½ ft.

Also all the varieties of hardy perennials Chrysanthemum described in Chapter VII are very useful.
2-3 ft. C. Uliginosum, 5-6 ft.

Coreopsis grandiflora, 2½ ft.

Delphinium. All varieties described in Chapter VII.

Also many of the numerous sorts described in trade lists. They need deep vases.

Doronicum austriacum and Harpur Crewe, 3 ft.

Erigeron. The two described in Chapter VII are splendid.

Eryngium amethystinum, 3 ft., and E. planum, 3 ft.

Gaillardia. The two varieties previously described are splendid.

Galega. All Galegas are excellent for cutting.

Geum coccineum, and G. c. Mrs. Bradshaw, 2-3 ft.

Helenium. All the sorts described in Chapter VII can be used, 2½-6 ft.

Helianthus Rigidus Miss Mellish, 5-6 ft., and the other sorts described previously are first rate for cutting.

Helleborus niger (*Christmas Rose*), 1½ ft.

Heuchera. Those described in Chapter VII, 1½-2 ft.

Inula glandulosa, 2½ ft.

Linaria dalmatica, 3 ft.

Lupinus polyphyllus (all varieties previously described).
Deep vases are required.

The flowers of the Tree Lupin (*L. Arboreus*) are not so good.

Lychnis. The three varieties described in Chapter VII can be used.

Pæony. Most of the sorts offered by the trade are more or less suitable for cutting.

Pansy. These must not be despised for cutting. They look best in low pots, or very small bowls. Most varieties are suitable.

Papaver orientale in most of its numerous varieties is more or less suitable, also P. nudicaule.

Pentstemon. All the varieties described in Chapter VII are more or less suitable.

Phlox. The species described in Chapter VII are all useful, but the varieties (so numerous now) of *P. decussata* are the best.

Pinks. Mrs. Sinkins is an old favourite for cutting.

Polemonium. All varieties described in Chapter VII.

Potentilla atrosanguinea, 1 ft., and hybrida, 2 ft.

Pyrethrum. All of the hundreds of named sorts are valuable for cutting.

Ranunculus. The varieties previously described, and others.

Roses. All roses are more or less suitable for cutting. See Chapter XII.

Rudbeckia laciniata, Newmanii, and others, 5-6 ft. and 3 ft.

Scabiosa caucasica, 2-2½ ft.

Solidago. The two sorts previously described can be used.

Statice latifolia, 2 ft.

Thalictrum (most varieties), 3-6 ft.

Trollius. The two previously described are excellent.

Valerian, 2-3 ft.

Veronica spicata cœrulea, 1½ ft. Several other Veronicas are more or less suitable.

CHAPTER XXI.

GARDEN IMPROVEMENTS.

THERE are few amateur gardeners who are not fond of making alterations in their gardens, and it seems to me that a short chapter on the subject of garden improvements may perhaps be useful.

The object of making alterations in the garden should be to make definite improvements, and not merely to afford "something to do this winter."

Those who are too fond of alterations are often people who cannot make up their minds what they like. Now it is a good habit to cultivate, that of making up one's mind what one likes; and it is a bad habit to be year after year changing the form of one's garden.

The effect of alterations cannot be fully appreciated in a year. Some people may think they see the results the moment an "improvement" is finished; but this is not possible. The effect will not be visible until the plants have grown up, and it may take two, or even three years before the results are fully exhibited. It is a case of "Wait and See." We have to do this in many other branches of life besides gardening.

The man who alters and "improves" his garden every year will never be satisfied. He cannot be. He has not time to study the subject, he has not time to observe the effects of his changes, and he leaves Nature no time to do her own inimitable part. His garden may have a freshness about it; there is always something new; but it is never without that newly made appearance which is contrary to all ideas of beauty. However artistically he may plan

his new paths or plant his new borders, or build his new rock-garden, he cannot get away from the fact that he did it last year. Newness is not pleasing, especially when it is perpetual. Most of us have to put up with it for at least a year, but we are glad when it wears off.

So the reader is advised to think long on the subject of improvements ere he makes them. It is a serious business, almost as serious as making a will. If the beginner thinks seriously on the task he is undertaking, he should not go far wrong. What he should want in his garden is a natural appearance brought about by age.

If there is any doubt of an alteration being an improvement, leave it alone. I advise experiments when they are justifiable, and they are justifiable after the subject has been well considered; but I condemn thoughtless experiments. The present condition of the garden may be far from pleasing and beautiful; but just what is required may not be certain even after most careful thought. In such a case try experiments but make no permanent changes for a period of at least two years. You will then get the full benefit of each experiment, and one or at the most two experiments will generally show you how best to improve your garden and make it beautiful.

If the garden is not beautiful at present it may be possible to turn it into one of exquisite loveliness by observing effects and plans in other gardens. Keep an eye open during the summer months, especially on holidays, for beautifully laid out and artistically arranged gardens. Some schemes may be too elaborate to imitate, but often an idea may be adopted with little or no difficulty.

Just as it is important to give a child a good copy to imitate, so also it is essential for the beginner to follow good models. He should not even regard beauty as everything, but should also consider the point of view of general utility and simplicity. A man who has never learnt painting must begin with simple designs. It is the same with the man who has never learnt garden planning and improving. He must begin with something simple and fairly easy to

carry out, and he can alter it if necessary when he has gained more skill.

I am all against elaborate garden improvements. A garden may be spoilt by over elaboration. Simplicity is quite as important as originality, and improvements are not worthy of their name if they lead to undue elaboration or complexity of design. Labyrinths of paths add considerably to the complexity of the garden, and in many cases it would be a great improvement to do away with all except those that are absolutely necessary. Complexity of the curves outlining borders is bad ; it is often an improvement to simplify them and make them more sweeping and continuous. Complexity in the shape of beds, such as lawn beds is also bad. Beds of all shapes in a small piece of grass look unsightly ; better have them all some fairly simple shape. They are then not only easier to plant, but easier to get the mowing machine round.

In Chapter XVI I said that paths should wind in and out of flower borders, that they should curve one way and curve back. This is simplicity itself, so long as it is not overdone and the paths are not curved sharply and doubled backwards and forwards unnaturally.

Summer Thought on Winter Work :—In the autumn and winter the gardening papers often print a good deal of matter dealing with garden improvements, but it seems to me that while these times are the best periods for carrying out such improvements, the summer months are the only time when they should be planned.

This, perhaps, applies less to structural alterations such as the making of paths, the building or extending of the rock-garden, and the position of garden steps. But it holds good in the replanting of flower borders, the extension of existing borders, the re-arrangement of shrubberies, and the placing of new arches, poles, or pergolas. These should be thought out in the summer.

It requires an old hand to plan good alterations and improvements without first seeing the existing state of

things in the summer. Mistakes are easy enough to make, and it is summer thought that will help the beginner to avoid them. Watch and see how things do as they are before deciding on a change.

I advise Summer Thought on Winter Work, for in the summer-time everything is growing and flowering, and if something is in its wrong place its right place can be found and noted down. Writers occasionally advise moving perennials, etc., in the summer months, because the positions which are suited to their height, habit, and colour can then be found. But I advise no summer alterations. Notes should be freely taken, and plans drawn up ready for planting time when it comes.

In the summer one can see how things do look and judge better how they will look. That is the time therefore for planning new borders, rose-beds, pergolas, poles, and other smaller garden alterations, so that they may be in harmony with existing background and other features of the garden. Summer thought is essential for the permanent success of all such garden alterations.

To sum up the main points of the chapter, the argument has been to avoid making too many "improvements" or alterations; to give each experiment a fair time, say two years, to judge of its result; to encourage originality of thought, and simplicity in garden design, and to point out the desirability of giving summer thought to projected "improvements."

CHAPTER XXII.

PROPAGATION OF PLANTS.

THE subject of propagation of plants is full of interest. It is not so difficult as many suppose, and with a little care there should be very few failures.

PROPAGATION FROM SEEDS.

The raising of plants from seed has already been fully described in earlier chapters on annuals, biennials, perennials, and rock-plants. It is much the same in all cases, following fairly closely that of half-hardy annuals, which may be summarised as follows: Shallow boxes are filled with light loamy soil, and the seed sown in January to February. The boxes are watered, and placed in a warm dark cellar. When the little plants appear, the boxes are placed on a shelf near the glass in the greenhouse. The seedlings are pricked off when large enough to handle, 3 ins. apart each way, into other boxes. In May they are hardened off in the way described in Chapter III, and planted out in their permanent positions at the end of that month.

PROPAGATION BY CUTTINGS.

I have dealt with the propagation of hardy perennials from cuttings in Chapter VI. But there are many other plants which may be propagated by cuttings, including half-hardy biennials, half-hardy perennials, etc. These are mostly plants used for summer bedding, and if stock is needed for next year the cuttings have usually to be taken in September. *Calceolaria*, *Pentstemon*, *Pansy*,

Viola, Pink, *Alyssum maritimum*, and saxatile, *Antirrhinum*, *Echeveria*, *Antennaria*, and other cuttings can be wintered in a cold frame merely protected from the coldest weather by covering the frame with a mat. Geraniums, however, must be wintered in a heated greenhouse, also *Lobelia cardinalis* and several others.

Taking the cuttings is simple work. In the case of Geraniums, strong non-flowering shoots, 4-5 ins. long, are taken off the plants, and cut just below or through a leaf-joint. Boxes are prepared containing a mixture of light loam and leaf-mould, with sufficient sand to keep the soil porous. The cuttings should have three or four or even more lower leaves removed. They are then inserted close together in a box of the light soil, by means of a dibber. They must be made firm and not "hung," that is, they must not be suspended in a hole with an air space below. The boxes are then well watered and put in the heated greenhouse "to strike." After this, water must be very carefully given or damp may set in. They are placed on a shelf close to the glass and given air on all suitable occasions after they have struck root. A few months later they may be potted separately into 3 in. pots.

For hardier plants put a frame upon a piece of ground which is not too sunny, and fork up the soil inside the frame. Cover this with 4 ins. of old potting soil; or if this cannot be obtained, with good garden soil mixed with a quarter of its bulk of silver sand. Gently firm this soil with the back of the spade, or with boards, and after scattering a little more sand on the surface, the bed is ready for the cuttings.

Take the cuttings from small non-flowering shoots with a sharp knife. *Calceolaria* cuttings may be 2-3 ins. long, *Pentstemon* 4 ins., *Pansy* and *Viola* 2 ins., *Alyssum saxatile* 4 ins., *Alyssum maritimum* 1½ ins., *Antennaria* 1½-2 ins., *Echeveria*, small rosettes, about 1 in., and *Antirrhinum* cuttings, 3-4 ins. long.

All these are cut just below or through a leaf-joint with

a sharp knife, and the lower leaves removed. They are firmly put into the soil with a dibber, about 2 ins. apart each way. It is a mistake to leave too many leaves on, and the cuttings should always be inserted as low down as possible. Give a good watering as soon as all the cuttings are in.

There are several methods adopted to promote the striking of roots, two of which I give here. The first is to put the lights of the frame on at once, and keep shut for at least six weeks; the glass being covered day and night with a mat. After this interval the mat is removed during the daytime and the cuttings given as much air as possible.

The second method is this: Put on the lights of the frame and keep them shut for a week or two. Expose to full sunshine when there is any, until the cuttings begin to droop, when a mat must be put on at once to shade them. After the first week or so give a little air and continue to expose the plants to all possible sunshine, shading only when necessary. By about the end of October all the cuttings ought to have formed roots, and should be given any amount of air on all sunny days.

The care of cuttings in winter is a matter which needs some consideration. Generally speaking, no water will be required at all from September to March. Damp is the great enemy of all cuttings in cold frames, and this can only be avoided by giving air on all possible occasions. Dead or decaying leaves formed on the cuttings should be picked off at once, and if the day is not suitable to give much air for a lengthy period, lift off the lights and turn them completely over so that they rest upside down on the frames. To do this, assistance is usually needed. When evening comes turn the lights over again. The object of doing this is to get rid of moisture which is always found on the inside of the glass after each night. This method is usually quicker than that of wiping the under-side of each pane of glass each morning, as is often recommended.

Cuttings of Pinks, Sweet Williams, Geraniums, Arabis, Alyssum saxatile, etc., may also be struck out of doors as soon as the plants throw up sufficient new growth. This period varies from June–August. Most of them will strike if merely put in a bed of light soil in the open ground, but better results are usually gained by raising a rough frame over the bed and shading them during hot sunshine. Cuttings so treated should be well rooted a few weeks later, but Arabis takes longer than the others.

How to Layer Carnations :—July and August are the best months for doing this, and it is quite an easy method of propagation so long as a little care is taken.

Put some light sandy soil into a basket, and take it to the carnation border, placing little heaps of it 2 ins. or so from the main stems of the plants. Cut some small pegs from forked twigs, the ends being pointed.

Now choose the strongest non-flowering stems, and remove the leaves some little distance along each. With a clean, sharp knife make a horizontal incision of the stem, starting at a joint. Make this slit parallel to the length of the stem, and let it be an inch or two long. Be careful not to cut the stem off, or it will only be of use as a cutting. Gently press the “tongue” made by your cut, outwards, and peg down the stem firmly into one of the heaps of sandy soil, covering it over with more soil, and firming with a trowel. Water gently at once, and repeat the operation with other strong shoots growing out around the plant.

The after treatment consists of watering when needed, and leaving the plants alone until the autumn. Then with a sharp knife cut the stem just behind the heap of soil where the stem joins the parent plant. The layer will now be isolated from its parent. I would always cut the layers a few days before the carnations are required for planting out, as it always gives a slight check. Then the layers can be carefully lifted with a spade and replanted in another part of the garden. Black cotton stretched over the plants between small sticks is the best means of

protecting them from birds, which are at that time of the year partial to them, and lime or soot will ward off slugs.

Sweet Williams can also be propagated in this way, and so can some shrubs which produce lengthy shoots from near the base. In this last case a small bucketfull of soil should be tipped near by, and some very strong pegs obtained. The slit is made in the same way, though it must be longer, and the tongue pressed outwards and downwards, pegged into the soil and covered over. But shrub layers must not be cut off till early the following spring.

Rock-plants from Cuttings :—The propagation of rock-plants is interesting work, and of many methods the one I shall describe presently is not often practised in the amateur's garden.

It is more usual to sow seed in the spring, or divide the "root stocks" of existing plants at that time, or in the autumn. But division of the roots means lifting the plants, and the rearing from seed usually necessitates a long period of growth before flowering.

Many of the Saxifrages, Sempervivums, Sedums, Drabas, and other rock-plants throw up in August crops of small rosettes round the larger rosettes of the parent plant. By these we can propagate such plants.

With a sharp knife cut off a number of these rosettes from each plant. Cut them as long as possible, and some will probably already possess roots. Have ready some light soil (the following might be used: 2 parts old turfy loam, 1 part leaf-mould, and plenty of sharp silver sand and small limestone chippings), and a 2½ in. pot for each cutting. Crock the pots well and fill in with compost, leaving a margin of ½ in. from the top. Put into each pot one of the rosettes, after removing any undesirable rubbish which may be on it. Plant each rosette firmly in the soil, throw in a few limestone chippings to remain on the surface and tap the pot on the bench to settle it. Group each sort together and label in some way. Water carefully as soon as the potting is completed. Then place

them in a cold frame, which should be reasonably low with the ground. Keep each group of pots to itself, and sink them up to their rims in coke dust or ash of fine texture. Keep the frame closed and shaded for a time and then admit air more freely.

Rock-plants propagated in this manner should remain sunk in the ash and protected slightly all the winter. They can then be planted out in the spring direct into the rock-garden, or they may be grown on in pots till the "cushions" are much larger. As with most things in cold frames during the winter, careful ventilation and watering are needed, and the lights should be off on all suitably warm days.

For rock-plants which do not produce rosettes in the month of August, some modification is necessary both as to time and method. But as a rule division of "root stocks" should not be done till autumn.

Those plants which throw up sturdy young shoots after flowering may be propagated in the following manner: Arrange a frame in a semi-shady part of the garden, well fork up the soil and throw on a quantity of old potting loam. Take the cuttings of strong growths, 2-4 ins. long, cut below a joint and strip off the lower leaves in the usual manner. Dibble these cuttings into the soil very firmly, setting them 2 ins. apart each way. Water well. Keep shaded and watered till rooted, when air can be given freely. They are best kept in a frame for their first winter.

Shrubs from Cuttings :—I have dealt with the propagation of roses from cuttings in Chapter XII, and have also dealt with the propagation of shrubs by layering earlier in this chapter. But there is another way of propagating shrubs, namely by cuttings, which deserves attention.

This is best done in the autumn. Shoots of varying lengths, from 12-18 ins. are cut off, preferably with a piece of older wood or "heel" attached to them. Ground in a lightly shaded part of the garden should be well forked over and broken up, and the cuttings inserted singly with

a deep dibber, about 6 ins. apart. They must be made very firm, and it is best to tread the soil on both sides of the row with your feet. Another way is to make a deep cut in the ground with a spade, then put in the cuttings close together and tread well.

Cuttings of shrubs should be left untouched for a year, and then they can be lifted and planted out permanently.

DIVISION OF THE ROOTS.

In Chapter VII I referred to the difficulty of propagating Lupins by division of the roots. Perennials with roots that are difficult to divide can generally be propagated by seed, so it is better in such cases not to attempt division, but to rely on the seed. But the majority of perennials are more or less easily propagated by division and the following is the best way to proceed.

Dig up the plants carefully and shake off a little of the soil adhering to the roots. Take an old sharp carving knife, and beginning at the top of the clump, cut it through into two or more pieces. Try to cut so that the outer pieces of the clump are of suitable size for replanting; the inner portions are always weakest so should be rejected. If an individual clump is 2 ft. across, cut it into pieces 9 ins. or so across, rejecting the centre portion. Do not plant bits of clumps smaller than 3 ins. across, for they look trivial in the border. Experienced gardeners can cut clumps up with a sharp spade, but it is more difficult, and a bad shot may ruin the clump.

Division of the roots is done in the autumn, or in the spring, not later than the end of March. Autumn division is in many cases the best, especially in a warm sheltered district, as it allows the plants to become well established again before the growing season commences. Most perennials require to be lifted and divided every three or four years.

Special Cases of Division :—Before closing this chapter it may be well to refer to one or two special cases.

Pyrethrums being early-flowering plants, may be divided after they have finished blooming in June. Similarly when *Doronicums* have finished blooming, the clumps may be lifted and gently pulled or cut to pieces.

I think myself that it is inadvisable to do this work of division after the plants have flowered during the hot months of the year. But if it is done they must have a great deal of water, and even then a severe check is often given them.

Anchusa has long tap-roots. This can be lifted when it has finished flowering in June or July, and its tap-roots cut into lengths and planted in sandy soil in a shady reserve border. Good plants may often be obtained in this way.

Some plants, such as *Helianthus rigidus* Miss Mellish, possess whitish underground shoots. These shoots can be broken into lengths, and two or three planted with a trowel to form a clump. Bury the points of the shoots 4-6 ins. deep in November or March.

Alstromeria, a perennial not described in Chapter VII, has fleshy roots, and if several small pieces of these are set in the soil 2-3 inches apart and 4-6 ins. deep, they will grow up and form a good clump.

Finally, be careful to remove broken bits of the roots left on the border after the plants have been divided. If they are not removed they will often grow and give the border a weedy appearance. They should on no account be dug in, but raked off at once and burnt. They are no good for the making of vegetable humus.

CHAPTER XXIII.

A FLOWER GARDEN CALENDAR.

WHEN I first planned this little book I did not intend to include "A Garden Calendar." But I have been pressed to do so and urged by friends who have told me they will be keenly disappointed if I omit it, so I cannot help myself. I must once again do as I am told.

I fear, however, that it is impossible to make it as interesting as I have tried to make other portions of the book. "Calendars of Operations" are dull reading. I know of only one exception, but that runs into over 400 pages.

The following Calendar is compiled from my experience in the Midlands. But it may be used by readers all over England, Scotland, and Ireland. Readers living in the South of England, where it is warmer, may anticipate the work, that is, they can do it a month earlier, and in the extreme South-West such as Cornwall, even earlier still. In Scotland, however, or in the colder northern parts of England, the work must be postponed several weeks; for instance, work described in the Calendar to be done in March should not be done until April. The climate of the midland parts of Ireland is similar to my own, that of the South to the Southern part of England, and that of the North to the Southern part of Scotland or the North of England.

This is all that it is necessary to say about the Calendar by way of introduction.

JANUARY.

Structural alterations of all kinds can be made provided that the weather is suitable. Such alterations include the making of new borders, and the building of rock-gardens. Also the erection of pergolas, poles, and arbours in positions assigned to them in the previous summer.

Push forward digging and trenching of the ground, and do not stint manure.

Sow half-hardy annuals in pots or boxes in a heated greenhouse.

Sow half-hardy perennials, half-hardy biennials and hardy biennials in boxes in a heated greenhouse.

Ventilate frames containing cuttings on all suitable days.

Prepare the ground for planting roses by digging it deeply, or trenching it in the manner to be described in the next chapter.

FEBRUARY.

Sow more half-hardy annuals in boxes in heat.

Plant roses in well-manured sites.

Plant shrubs of all kinds.

Lightly turn over the soil in existing shrubberies after removing laurel and other acrid leaves, and pine needles, which may be lying thereon.

Finish trenching of borders and continue outdoor digging.

Start planting hardy perennials of all kinds in borders out of doors.

Continue building rock-gardens, and if the weather is warm start planting them with alpine.

Ventilate frames containing cuttings.

Continue making structural alterations and improvements in the garden.

Plant anemones and ranunculuses if this has not been done.

Take cuttings of early-flowering border chrysanthemums.

Lay turf paths and trim up existing grass walks.

Stir the soil round bulbs which are coming up.

Turn over heaps of leaves which are being made into leaf-mould, and sprinkle them with a little lime.

Apply soil-fumigants during outdoor digging.

MARCH.

Sow more half-hardy annuals in boxes if those sown in January have not come up well. Put in a warm position in the greenhouse to hasten their germination.

Prick off half-hardy annuals, half-hardy biennials, and half-hardy perennials sown in January into boxes of light soil. Water well and put in a position close to the glass, to prevent them becoming drawn and lanky.

Propagate Geraniums by cuttings planted in boxes of sandy soil.

Ventilate frames containing cuttings.

Sow hardy annuals in pots or boxes. Sow thinly and cover up the boxes with glass and brown paper, putting in a warm corner to hasten germination. Afterwards place in a cold frame.

Sow Sweet Peas in pots. Five seeds will go to a 3 in. pot. Place pots in warm dark cellar till the seeds have germinated ; afterwards place in a cold frame.

Plant perennials of all kinds, finishing the work by the end of the month.

Fork over the soil in existing perennial borders and in rose beds, working in a little decayed manure.

Finish planting roses.

Finish structural alterations of all kinds.

Plant all sorts of rock plants.

Stir the soil round bulbs to assist their growth.

Lay in bulbs after forcing, in a shady site, that they may finish their growth.

Plant out Carnations and Pinks in their flowering positions towards the end of the month if this was not done last autumn.

Annuals sown outdoors in the autumn may have the

soil stirred about them with great advantage, and should be thinned out.

Finish winter digging.

APRIL.

Sow hardy annuals in clumps out of doors.

Sow Sweet Peas in lines or clumps out of doors.

Prick out hardy annuals sown last month in pots, using large boxes of light soil for the purpose.

Finish planting the rock-garden with alpine.

Plant out Sweet Peas sown in pots in March, at the end of this month.

Prune roses and shrubs.

Water hardy annuals sown out of doors regularly if the weather is dry.

Mulch roses with short manure.

Plant out Calceolarias and Pentstemons in the borders towards the end of the month.

Plant out early-flowering border Chrysanthemums towards the end of the month.

Hoe flower borders regularly once a week, and remove the weeds which are uprooted.

Half-hardy annuals, half-hardy biennials, and half-hardy perennials should now be hardened off. Hardy biennials and hardy perennials raised from seed sown earlier may now be planted out.

Water newly planted perennials if there is a dry spell.

Dahlias can now be started by putting the roots close together in boxes in a warm corner. The roots should be lightly covered with fine soil, and the tubers can be shortened and trimmed up.

Pansies and Violas may be freely planted out as an edging to the borders.

MAY.

Sow half-hardy annuals out of doors. Half-hardy biennials and half-hardy perennials may also be sown in

the open. Hardy biennials and hardy perennials may be sown in a rough frame. ght soil.

Thin hardy annuals sown out of doors last month and water them regularly in dry weather.

Plant out all kinds of hardy annuals sown in March. The distance apart varies from 3-18 ins.

At the end of the month plant out half-hardy subjects sown in January for "summer bedding" after hardening them well by gradual exposure to the air for several weeks prior to planting.

Start staking early-flowering border plants.

Dust the soil round choice subjects such as Pyrethrums with lime or soot to ward off attacks of slugs.

Keep the hoe going regularly in the flower borders, and give all flower borders and shrubberies a thorough good raking over to make them of neat appearance.

If the weather is hot mulch perennials by putting a layer of short manure round their roots.

Prick out late-sown annuals.

Polyanthuses and Auriculas should now be lifted as they finish flowering, and planted in a shady reserve bed. They can be divided next month.

Bulbs should now be lifted from the flower borders, and either naturalised at once, or laid-in in a shady North border to finish their growth.

At the end of the month Dahlias can be planted out in the open ground. They require a rich soil.

JUNE.

Finish planting out half-hardy subjects during this month. Water thoroughly as soon as the work is completed, and each evening if the weather keeps dry.

Early-flowering perennials may be fed with weak liquid manure, and cut down as they go out of bloom.

Perennials may now be propagated by means of cuttings. Seeds of biennials and perennials may be sown out of doors or in a frame. Keep them well watered.

Rock-plants should be cut back after flowering and have the dead blooms clipped off.

Choice wallflowers may be propagated from cuttings. These must be struck in a heated frame.

Keep the hoe going once a week through the borders, and resort to hand weeding if necessary.

Lift late-flowering Tulips and plant them in a shady border to finish their growth. Plant the beds made vacant with late-sown hardy annuals.

Lift bulbs put in the shady border last month. Put them in the sun to dry for a short time, then clean and store in bags in a dry shed till next autumn.

Continue to lift late-flowering Polyanthes and plant in a shady position. Divide those lifted last month and plant the strongest pieces in light shady ground in rows 6 ins. apart each way.

Cut flowers from the borders regularly and remove dead blooms or spikes of bloom as soon as formed.

Give hardy annuals their final thinning.

Continue staking all kinds of border plants as soon as they begin to need it. Rather put the stakes in too soon than too late, for if the plants are left without support they fall about and are quickly ruined.

Garden paths should be weeded. An application of salt in dry weather will generally kill most of the weeds.

Pinch out the tops of the growths of hardy annuals to induce them to become bushy.

Turn over heaps of leaves for leaf-mould, sprinkling a little lime over them.

Start from now or last month in real earnest to collect all soft vegetable refuse to be made into vegetable humus (see Chapter XXVII).

Burn any hard or seeding weeds, and store the ash in a dry place.

JULY.

Shrubs of all kinds may now be pruned. Hawthorn, Holly, Privet and other hedges can be clipped. Rake

the material together and burn it. Lightly fork over the ground around the shrubs after this is done, or hoe it and well rake it over.

Perennials should be propagated now by sowing seeds in the manner described in Chapter VI.

More cuttings of perennials may be put in. Perennials and biennials can be cut down as they go out of bloom and fed with liquid manure.

Wallflowers, Canterbury Bells, Polyanthuses and other plants should now be sown for display next spring. The sowing can be made in a frame.

Growths of climbing roses can be shortened somewhat.

All dead blooms should be removed from annuals and perennials in order to ensure a further display. Renew the mulches if they have become dried up.

Continue to pinch out the top growths of annuals to induce them to become bushy.

Mow the lawn and all grass paths regularly once a week.

Continue to stake out and tie up all kinds of border plants. Be careful not to do this too tightly, or they will have an ugly "bunched" appearance.

Water all kinds of bedding plants freely, also the perennial and other borders if the weather is dry.

Turn over heaps of leaves for leaf-mould and sprinkle a little more lime over them.

Turn over heaps of vegetable humus (see Chapter XXVII).

Clip grass verges after mowing the grass, to give the edges a neat and smart appearance.

Roll paths regularly.

Clip off dead flowers from rock plants and water the rock-garden.

AUGUST.

Go for a short gardening holiday if your work permits. Choose some rocky district like Derbyshire, North Yorkshire, Cumberland, Devonshire, or Wales if you want to enrich your rock-garden with alpine plants. The

importance of a holiday cannot be too strongly urged. The gardener will come back to his garden with renewed vigour, and will have benefited physically and mentally.

Prick out hardy perennials into reserve beds or frames.

Dig out the heap of leaves which will now be pretty good leaf-mould. Store in a heap on the reserve garden in order to make room for leaves which will now begin to fall.

Bulbs may be planted in the wild garden or wilderness, but it is not absolutely necessary to do this yet.

Plants of all kinds in summer beds will want watering if the weather is dry, and can be fed once, twice, or thrice a week with diluted liquid manure.

Keep the hoe going over the flower borders and remove all the weeds uprooted. Hand weeding may be necessary.

Cuttings can now be taken of Geraniums. These can be put in out of doors and will usually strike readily.

Rock-plants may be propagated by cuttings in the manner described in Chapter XXII.

Roses can be propagated by cuttings in water if this has not already been done.

Carnations should be layered ; this can also be done in July.

Pinks, Arabis, Sweet Williams, Alyssum saxatile and other subjects can be propagated by cuttings if the plants have not previously thrown up a sufficient quantity of young growth.

Dahlias should be freely watered and fed during this month. All new growths should be carefully tied in.

Early-flowering border Chrysanthemums should be given extra ties.

Pansy and Viola cuttings may be struck, but there is plenty of time yet.

Prick out seedling Wallflowers, Canterbury Bells, Sweet Williams, Polyanthuses, etc., into reserve beds, and keep them well watered.

Continue to cut flowers freely from the borders and remove all dead blooms at once. Go over the borders and

mark those perennials in the wrong positions with sticks, and make a rough plan showing the positions intended for them.

Hedges and shrubs may still be clipped and pruned, but it is getting rather late for this work.

SEPTEMBER.

Clear the ground of annuals which have ceased blooming.

Sow hardy annuals out of doors if the district is a warm one. If not, wait till the spring.

Sweep up leaves regularly once or twice a week, and put them in a heap for leaf-mould (see Chapter XXVII).

Continue to stake and tie border plants, especially early-flowering border Chrysanthemums and Dahlias.

Cut flowers regularly from all border plants and remove dead blooms. Keep the beds hoed and weeded, and cease feeding the plants at the end of the month.

Put in more Pink, Arabis, Sweet William, and Alyssum saxatile cuttings if a further stock is required.

Propagate Calceolarias, Pentstemons, Alyssum maritimum, Pansies, and Violas by cuttings, as described in Chapter XXII.

Propagate shrubs from cuttings.

Propagate roses from cuttings towards the end of the month by the open air method previously described.

Cease mowing the lawn for the winter at the end of the month unless the weather is very warm and open.

Make plans for structural alterations and improvements if such are projected.

Plant out rooted layers of Carnations.

Bulbs can be naturalised in the manner described in Chapter XV. Also they should be potted for use indoors (see Chapter XIII).

Remove suckers from roses and cut back the shoots slightly if they are getting too long.

Pansy plants from cuttings rooted last month may be planted out as an edging to the borders.

Hollyhocks can be propagated from cuttings. Use the growth thrown up at the base of the plants, cut each shoot below a joint, and put in a frame of sandy soil.

OCTOBER.

Shrubs can be propagated by layers or cuttings.

More cuttings of *Calceolarias*, *Pentstemons*, *Violas*, etc., can be put in if some of those inserted last month have failed to live.

Continue to sweep up leaves as they fall, for leaf-mould.

At the end of the month shrubberies can be forked over after raking off any undesirable shrub leaves and pine needles.

Structural alterations and improvements can be commenced and should be pushed forward on fine days.

Rock and border flowers of all kinds may now be planted. Rock-gardens should be top-dressed with fine soil early this month.

Cut down border plants when they have finished blooming, to within 3-4 ins. of the ground. No further crop of flowers will be given.

Cut flowers regularly from plants still in bloom, and keep the soil well hoed around their roots.

Pull up annuals which have gone out of bloom.

Roll garden paths well, if possible once a week.

Pull up summer bedding and plant winter or spring bedding plants such as Wallflowers, Forget-me-nots, Sweet Williams, Canterbury Bells, *Alyssum saxatile*, *Arabis albida*, etc. The Canterbury Bells and Sweet Williams should have a bed to themselves for they are not over by the time the Wallflowers have to be taken up (see Chapter V).

Plant bulbs in beds and borders as advised in Chapter XIV. The earlier this can be done the better.

Naturalise bulbs in grass as described in Chapter XV.

Ventilate frames containing cuttings on suitable days.

Continue to stake and tie up late-flowering border plants,

and thin their growths a little if necessary by cutting out weak flowerless shoots.

Lift Dahlia roots as soon as there has been the first slight frost. Store them in sand in a frost-proof shed.

Plant out Polyanthuses in beds to themselves.

Seedling Hollyhocks, and small plants of the more delicate perennials such as *Aquilegias*, *Thalictrum*, *Campanulas*, etc., etc., sown in the summer should be planted in frames, otherwise it is doubtful if they will stand the winter. Seedlings of stronger perennials such as *Doronicums*, *Chrysanthemum maximum*, *Heleniums*, etc., can now be planted in their flowering positions in the perennial border.

NOVEMBER.

Finish sweeping up leaves for leaf-mould and add a little lime to them.

Finish planting bulbs in the borders and finish naturalising them.

Continue making structural alterations and improvements when the weather is open. Rock-gardens can be built, new paths made, pergolas, arches, or poles erected, borders extended, lawns laid, shrubberies planted and other similar work done.

Fork over the soil of existing perennial borders, working in a little rotted manure.

Dig or trench the ground for new perennial borders. Trenching is described in the next chapter.

Ventilate frames on all suitable days.

Water plants in greenhouses carefully.

Lift bulbs potted early and transfer them to rooms in the home, to the greenhouse, or to a frame.

Lift early-flowered border *Chrysanthemums*, and plant them in a frame.

Burn hard refuse and store the ash in dry shed.

Turn over heaps of vegetable humus (see Chapter XXVII).

Plant roses in well dug sites.

DECEMBER.

Continue to make structural alterations of all kinds.

Get on with the digging of the flower borders and the trenching of vacant land.

Plant rock-plants and perennials if the weather is good.

Ventilate frames on all suitable days.

Lift more bulbs from where the pots were buried in the garden and bring them on.

Plant more roses if the weather is good.

Roll garden paths frequently during winter weather.

Go round and make perennials firm in borders; after a severe frost it will be found that they have been loosened.

Protect annuals sown in the autumn, from slugs. Carnations and Pinks must also be protected.

Go over the potting shed and overhaul the tools. Scrub plant boxes and pots, paint empty frames to be in readiness for next year.

Purchase a stock of potting soil and store it in a dry shed or protect it out of doors from rain.

Knock snow off shrubs. If this is not done they are often ruined.

CHAPTER XXIV.

SOILS AND THEIR MANAGEMENT.

What Soil Consists of :—Let me take my reader into the garden for a moment to get a sample of soil, and having got this let us go into the potting shed and examine it. Of what does it consist ?

First of all we may pick out the stones and say that it consists of stones and earth. Yes, but for our purpose we want to know a little more about it than that.

Let us examine the earth after we have picked out the stones. If it is an average sample of garden soil, we shall see that it consists of particles of sand, of clay, and of a peculiar black substance. This last is known as humus, and on account of its great importance is dealt with at greater length in Chapters XXV and XXVII.

Next, if we put a table-spoonful of the soil into a jar and shake it up with water, we can separate the sand ; it is left at the bottom of the jar and can be washed clean and examined. If, however, we dry some of the soil and heat it well above the boiling point of water (212° F.) most of the peculiar matter called humus will disappear, and we shall have a soil containing mineral matter only. So we say that a good garden soil contains mineral matter (including sand and clay) and humus.

Now, let us pour cold water on to this mineral matter when it has cooled down. The water must not be hot, for we do not water our plants with hot water.

Stir the mineral matter well up in the water several times, and the larger the quantity the better. Then allow the sediment to settle completely and pour off the water

into a dish; put the dish into an oven and gradually evaporate until there is no water left. Is there any solid matter visible in the dish? Perhaps not. Then the soil is poor. Perhaps there is a little? Then the soil is good. But if there is much of it, then the soil is too rich. An authority has said that "a soil containing more than a twentieth part of its weight of soluble matter is too rich for plant life." It is most unusual to get so much as a twentieth part of soluble matter, but in such a case the soil can be greatly improved by adding to it some very poor loam.

So now we say that our soil consists of mineral matter partly soluble in water, but mostly insoluble, and of humus.

We may go a step farther and have our soil analysed by a chemist. And if it is an average sample of loamy soil it will contain about 20–22 % of sand (oxide of silicon), and the following ingredients will be present in small quantities:—Lime (as carbonate, phosphate, or sulphate of Calcium); Magnesia (as silicate, chloride, or carbonate of Magnesium); Soda (in the form of salt=chloride of sodium, or a trace of nitrate of sodium); Potash (as silicate, or carbonate or a trace of chloride of Potassium); Sulphur (in the form of sulphates of various kinds such as sulphate of Calcium); Alumina (as double silicate of Aluminium and Potassium=ordinary clay); Chlorine (as Chlorides of various kinds, such as chloride of sodium=salt, double chloride of potassium and magnesium=Kainit); Manganese (as a trace of oxide of manganese); Iron (as Ferric Oxide, or as Ferrous or Ferric Sulphate); Phosphorus (as Phosphates of various kinds such as Phosphates of Calcium); and Carbon (in the form of carbonates, such as carbonate of Calcium=chalk).

Thus it will be seen that the soil contains twelve different elements, Silicon, Calcium, Magnesium, Sodium, Potassium, Sulphur, Aluminium, Chlorine, Manganese, Iron, Phosphorus, and Carbon. Sometimes it contains yet others, such as traces of copper, barium, chromium, lead,

strontium, zinc, etc., but more usually these are absent. The analysis by your chemist friend will show that some of the twelve elements in the list are only present in very small quantities. The prevailing elements in a good loamy soil are Calcium, Potassium, Aluminium, Silicon, and Carbon. These are grouped together to form the following ingredients of soils: clay (silicate of aluminium and potassium), sand (oxide of silicon), chalk (carbonate of calcium). And in addition to these *mineral* compounds we have humus which is *organic*.

Different Kinds of Soils :—Everyone must have noticed that there are many different kinds of soil. It may be very light and sandy, composed largely of red sand, or of yellowish sand; or of clay containing iron (distinguished by its reddish appearance); or of clay containing no iron (usually grey or very yellow); or of really good black earth. These are only a few of the many kinds of soils he will meet. Two others I must mention are limey or chalky soils containing as much as one-fifth of their weight of carbonate of lime; and humic soils containing over much vegetable or animal humus. The nature of the underlying rocks has, of course, much to do with the nature of the soil. If they are of chalk or limestone the soil will be chalky or limey, if of sandstone it will be sandy, if of clay it will be clayey.

What the Soil Provides :—Now it will be evident that the soil provides both board and lodging for our plants. The soluble ingredients provide the board, or food of plants, and are sucked up by the roots and used for building up tissue. But plants also absorb carbon dioxide from the air by their leaves, and some few also nitrogen for building up root nodules. Nitrogen and carbon dioxide are found in the air, so we may say that plants feed on the air as well as the soil.

The insoluble portion of the soil, whether mineral or organic, provides lodging for the plants, and if the lodging is not in a suitable friable condition, the roots of our plants cannot work in it. Thus it is evident we must *cultivate*

our soils to make and keep them in a suitable condition for providing food and lodging for our plants.

There are four general methods of cultivating soils:— (1) Digging, (2) Trenching, (3) Hoeing, and (4) Raking.

Digging:—Digging is of two kinds, single and double. The best tool to use is a No. 3 Spade made of cast steel. Amateurs should not be tempted by the nice appearance of the No. 1 Spades, unless, of course, lack of strength compels them to forego the use of a No. 3. No. 3 Spade has a blade 12 ins. long, the blade of No. 1 is hardly 9 ins.

In digging over a plot of ground by the "single" method, a trench to the depth of 1 ft. is taken out right along the width of the plot and the earth wheeled away to the other end of the plot. Then 3 ins. of manure is put into the trench. Now take out a second trench along the side of the first trench, turning the soil on to the manure in the first trench, and thus leaving open a second line of trench. Three ins. of manure is put at the bottom of this, and then another line of soil turned on to it. In this way go on working backwards to the end of the plot, and the soil taken out of the first trench and wheeled away, is used for filling up the last trench.

Double digging takes somewhat longer. Take out a trench 1 ft. deep along one side of a plot of ground and wheel it to the opposite side as already described. Then standing in the trench take two or three spadefuls out at one end of it, leaving a hole nearly 2 ft. deep. Into the bottom of this put a layer of manure, and stepping back, still in the trench, turn the soil over into the hole, covering the manure to the depth of nearly 1 ft. Then put manure into the second hole and turn the next portion of the trench into it. Continue this operation to the end of the trench, where there will be a hole to fill up with the earth from the first hole at the other end of the trench. But we are still left with a trench about 1 ft. deep along the first line. Put manure into this, and then open up a second line of trench by turning the soil into the first line. Then dig out a hole at the end of this second trench, put manure in, and

continue as before. It is possible to do double digging in double the time that it takes to do single digging, but at first it takes somewhat longer. However, the time is by no means wasted.

Allied to digging is "forking." In the Garden Calendar there were directions to fork over shrubberies, etc. This is done by lifting and carrying several clods of soil from one end of a plot or bed to the other end till a little trench is formed. The soil behind is then turned into this trench, forming a new trench behind the first. This again is filled by turning in the soil behind, and so on, the last trench being filled with the soil first taken out.

Trenching:—There are two kinds of trenching—simple trenching and false trenching. False trenching is resorted to where there is not sufficient depth of good soil. Trenching is important if not essential, and it is a good plan to trench each flower border every three or four years. This is best done during the winter.

For simple trenching the plot is divided into sections 2 or 3 ft. wide. The soil is taken out throughout the length of the first section to the depth of two spades or "spits" as they are often called, that is, to a depth of about 2 ft. This soil is wheeled away to be used to fill in the last section of the plot. Then break up the soil at the bottom of the trench, dig in some manure, and put a layer of manure on the top. Now proceed to dig the top "spit" of soil of the *second* section, turning it over into the open trench of the first section. After covering this with manure lift the second spit of the second section on to the top of the first section which will then be filled in to its original level, leaving the second section open. This of course is treated in a similar way, from soil taken from the third section, working in manure as before; and so on throughout the plot, the last section of the plot being filled in by the soil wheeled away from the first section. Thus in true or simple trenching the second spit of soil is brought to the surface, and the top soil is buried.

• It will now be easy to see why true or simple trenching

is not possible where the soil of the second spit is not good enough to bring up to the surface. In my own garden there is only about 1 ft. of good black soil, below that is yellow shale, clay, and stone, or "red sub-soil" as it is called in Yorkshire. We are, however, gradually improving this by false trenching.

False trenching is a little more difficult, and it takes longer. The plot is divided into sections as before and the soil of the first section is also dug out to the depth of 2 ft. (two spits). But in this case the soil of the top spit is kept separate from that of the second spit, though both are wheeled away and shot up on an adjoining plot, after the stone has been picked out of the soil of the second spit. Now dig out the top spit of the second section of the plot and wheel it also away, shooting it up with the soil of the top spit of the first section. At this point the trench in the second section will be 1 ft., and that in the first section 2 ft. deep. The soil at the bottom of the first section is now broken up with the spade or digging fork, and if there is stone it may be removed by using a pickaxe or crowbar. If it is a very thick tenacious clay, it will dig better with a navy's spade than an ordinary No. 3 garden spade, or better still with a good strong fork. Having done this and dug in some manure, place a layer of manure on the top. Now turn the second spit of the second section into the first section, mixing in some road scrapings, leaves, sand, lime, soot, wood ashes, or even fresh soil if possible to improve it. But do not fill in the first section higher than 1 ft. from the surface with this poor material; wheel away what may be over to the rubbish heap, a portion of it may be burnt when the rubbish fire is burning strongly. Now turn the top spit of the *third* section on to the soil you have just placed in the first section. When that is done the first section will be completely filled in, the second section will be open 2 ft. and the third section 1 ft. deep. Repeat this process to the end of the plot, filling in the last two sections with soil taken away from the first.

It will be evident that in this manner of trenching all the

bad sub-soil is kept below the good soil ; but at the same time it is improved, and if the process is repeated each year, in a few years the plot may be truly or simply trenched.

Hoeing :—Hoeing is of very great importance because (1) it reduces evaporation, and so reduces the need for watering ; (2) it aerates the surface soil ; and (3) it helps to keep down weeds. It is not necessary to enlarge upon these benefits, but I take the opportunity of pointing out the great value of regular hoeing. Some may think it is waste of time, but it is not ; no time spent on hoeing is wasted, both plants and soil are greatly benefited.

If the hoe can be run regularly every fortnight down the rows of annuals, between beds of biennials, along the borders of chrysanthemums and dahlias, and through the perennial border, from April onwards, it is not too often ; the rake is not needed if the hoeing be neatly done, unless there are weeds to remove. Always work backwards along the plot, and if possible hoe several inches deep, except close to the roots of the plants.

A good time to hoe is after a shower, when the soil is just starting to dry. It should then run over the blade of the hoe very well. But do not wait for a shower. Ground should always have been recently hoed before watering, as then the water quickly soaks in.

I have so far spoken only of the Dutch or " push " hoe. There are others, such as the triangular hoe for making drills, and the Canterbury hoe for chopping up big weeds. But although these may have their merits for the purposes to which they are specially adapted, they are not to my mind nearly so generally useful as the Dutch hoe.

Raking :—Next in importance to hoeing comes raking. Generally speaking we use the rake more for the sake of tidiness than for the actual benefit it does to the soil. Those who are learning to use the hoe find it difficult at first to leave their work neat enough without using the rake. But after hoeing a weedy piece of ground it is of great importance that the weeds should be raked off or they will start to grow again. The rake is also useful for removing stones from

beds to be sown and planted : if used carefully a fine surface can soon be obtained.

For myself I condemn the use of the sharp, long-toothed iron rake. These iron rakes which amateurs are told are "the very thing," are to me abominations. Their long teeth hinder the production of an even surface, the sharpness of the teeth enables leaves or weeds to choke them every few minutes, and their general awkwardness prevents the gardener making long sweeps or reaches with them. They are often very narrow, and the teeth so close together that it is hard to remove a stone which may be caught in them.

The blunt short-toothed iron rakes are bad enough, but not so bad as the above. To my mind, a wooden rake is far the best, a rake made entirely, teeth and all, of wood. The teeth should be about $\frac{1}{4}$ in. or more across, rounded, but not pointed, and placed about 2 ins. apart. The bar holding the teeth may be about 1 ft. long, fitted to a handle 5-6 ft. long. Ash handles are the best.

A wooden rake of this kind is a capital tool, and will quickly bring a bed to a fine surface. Seeds can be raked in better with wooden than iron rakes, and covered to a more even depth.

Improvement of a Sandy Soil :—A sandy soil is a poor dry soil which is hard to improve. The best method is to trench it and work in a lot of manure and leaves in the early winter and to "clay" or "marl" it immediately. Clay and marl are usually delivered in big lumps. These should be broken up so that they do not exceed 6 in. blocks, and put on the land 1 ft. or more apart each way. The frost will disintegrate them, and they can then be easily broken up in the early spring with the spade and dug in to the depth of 1 ft. Marling has to be renewed during several years before the soil is got into a reasonable condition.

If clay or marl is not obtainable, then it is inadvisable to dig or trench in the early winter. It should be done at the latest possible moment in the winter, and a liberal amount of manure put in. The reason for this is that the

manure will be mostly washed through and lost unless it is applied after the heavy winter rains and snow. A little waste cannot be helped during the marling year, for it is inadvisable to trench the soil when the marl has only been on a month or two. Sandy soils may be improved gradually, but it is a long and expensive process.

Allied to sandy soils are gravelly and flinty soils. These can be greatly improved by deep digging or trenching, all the largest stones being picked out. The wooden rake comes in useful here. The oftener it is passed over the surface after digging, the better the soil will become; and with the aid of plenty of manure such soils will soon be greatly improved.

Improvement of Clayey Soil:—I have already given some suggestions on the improvement of a sub-soil composed of clay, shale, etc., in the section on trenching. If the clay is on the surface it is more difficult and it may be several years before a decent tilth is obtained. Here deep false trenching and the thorough mixing in of road-scrappings, coal, furnace, and wood ashes, lime, old turf, leaves, manure, sand, old mortar rubble, etc., with both spits is advisable. The use of lime is most important. Break up the clay with a fork and spade and mix in these materials as well as possible. Leave the surface of the border rough so that the frost can get through.

If it is not possible to trench with the above thoroughness, divide the plot into sections and throw up the soil into ridges, piling the clay as high and as rough as possible in October or November. The frost will then disintegrate the clay and in the spring the ridges can be levelled down. The soil will also be greatly improved, and still further so if road-scrappings and manure are dug in.

Clay soils which are usually so wet in the winter require to be frequently forked up and hoed and stirred during the summer months, or they will become hard and baked, and water will not filter through them. They are hard to work, but I prefer a heavy soil to a light one. Light soils are harder to improve than clayey ones, for they sometimes

swallow up endless quantities of marl, manure, and vegetable humus. A clay soil is also much richer in itself when it has been improved than a sandy soil is, it retains a lot of valuable plant food.

Chalky Soils :—The improvement of soils resting on chalk or limestone is a matter of some difficulty, seeing that often one-fifth of their weight consists of carbonate of lime. Digging and enriching with manure, road-scrapings, etc., is useful and should always be carried out. However, it will be well to give a more particular method. In the chapter on artificial fertilisers I referred to a manure called superphosphate ; this is most useful on land which contains too much carbonate of lime. It should be applied in the autumn at the rate of 2–3 ozs. per square yard, well forked in ; and another dressing of not more than 2 ozs. per square yard can be given the following spring. Such land will be rich in phosphate ; and Lupins, Galegas, and Sweet Peas, should do extremely well in it.

I have heard of another treatment, upon which, however, I can express no opinion. It is as follows. Dilute strong hydrochloric acid with four times its volume of water and sprinkle over the ground. The soil, I understand, must be dug over at once, and the ground is said to be much improved. But nothing must be planted or sown there for several weeks. It is well to point out that this acid is dangerous stuff unless great care is taken. It will burn a hole in clothes, causes bad wounds on the flesh, though it is not quite so bad as nitric or sulphuric acid. It is well to pour it into the water, not water into it, and the water should be cold.

Manures containing decomposable lime are unsuitable for application to a chalky soil, and should never be used.

Humic Soils :—Something has already been said about these in Chapter XIX, where I pointed out how undesirable summer feeding was for plants grown in such soils. The word humus is explained more fully in the next chapter. Soils sometimes contain as much as 20 % of humus which

is far too much for an all-the-year-round average; 12 % of humus is a very rich soil, too rich for some plants.

Humic soils are often, but not always, sour soils. But they are too rich and too much like manure beds to grow flowers in. Lime is the corrective, ground chalk can be used, and poor soil added. Four ounces or more of lime, or 2 lbs. of chalk per square yard can be safely used, and will greatly benefit the soil. The lime or chalk should be forked in at once. Superphosphate of lime should not be used on such soils for several years; nor should organic manure be dug in for two summers.

FINAL WORDS.

Before I close this chapter I must add that the careful study of his soil by each individual gardener is most important. Good cultivation always pays, a gardener will never regret any hours of study he has given to his soil, or the days and weeks he has spent on it with his spade, fork, hoe, and rake.

CHAPTER XXV.

ANIMAL MANURES.

THROUGHOUT the last chapter much stress has been laid on the importance of working in plenty of manure during the digging or trenching of all soils except humic soils. And in Chapter XIX I pointed out what a bad policy it was to try to do without winter manuring and to rely on summer feeding.

My doctrine has always been "Use plenty of Manure." I firmly believe that manure is the gardener's best friend, so long as it is given at the right time (in the winter), and put in the right place (below the soil, a foot deep).

But my own experiments and those of others, the results of which have been sent me, have compelled me to change or modify some of my earlier views on the subject.

Animal Manure not Essential :—An extensive series of experiments which I have carried out during the last few years have shown that an annual dressing of *animal* manure is not essential to success in the flower garden. Some form of humus is essential each year, but this need not always be in the form of animal manure. My experiments have not gone so far as to show that other manures are better than animal manures, but merely that animal manures each year are not essential to success. I am a great believer in the use of animal manures in quantity where they are available, but it will be some comfort to those who cannot get them easily to know that there are other manures which can be used with good results.

The Composition of Manures :—Animal manures contain many mineral salts, some of which are soluble in water.

Fermentation produces ammonia and other gases which escape into the air and so are wasted. The chief mineral constituents are nitrogen, potash, phosphorus, and lime. Now these four elements are essential to plant life, and as they are all contained in animal manures they are known as "complete" fertilisers, to distinguish them from simple chemical fertilisers like nitrate of soda.

But animal manures contain a still more important ingredient, "Humus." Chemists have mixed what are called "complete" fertilisers from chemicals, and I give some recipes in the next chapter; but however complete and carefully compounded they may be, they lack one ingredient of the utmost importance, namely, "Humus."

Humus and the Soil:—Humus may be defined as the product of complete putrefaction of animal or vegetable refuse. So far as I am aware no chemist has ever been able to make it, hence the failure of artificial fertilisers as complete substitutes for organic manures.

I do not think plants absorb humus directly into their systems through their roots. My own theory is that the humus must be decomposed first by soil bacteria, and so changed into soluble compounds.

Humus is essential to plants for at least two reasons, namely, to hold moisture, and to keep the soil warm. It is a blackish-brown material, soft to the touch, and very readily dirties the hands or clothes. It is what gives the soil its black colour, and this black colour is most important. It absorbs the sunshine while the sun is out, and radiates it after the sun has gone in. Soils which do not contain humus are subject to sudden changes of temperature, those which do contain it are more equable and warm.

Some Useful Manures:—I place farmyard manure first. It is the best for general purposes in the garden, and any soil, whether sandy, clayey, gravelly, chalky, or good loam, will benefit greatly by having a dressing of it in winter. Usually it consists of a mixture of manures, and if well turned over during its process of decomposition its richness is conserved. Analysis shows that it contains considerable

percentages of nitrogen, phosphates, potash, and lime, all of which are, after fermentation, in a soluble condition. Use about 3 cwt. of farmyard manure per square rod.

Stable manure is of next importance. It contains more phosphates than any other simple animal manure especially if the animals have been fed on grain. It is very useful on a heavy soil. For digging or trenching strawy manure is best; for forking or turning into existing borders what is known as "short litter" is the best and easiest to manage. About 4 cwt. of stable dung can be dug into a square rod, or rather more if the soil is poor.

At the present time stable manure is very hard to get in a condition one would like to have it. Farmers are economising by bedding the animals on peat-moss litter or sawdust and shavings instead of straw. The manure so obtained is bad for gardens, though that from peat-moss litter is not so bad as that from sawdust. Sometimes it must be used, in which case it is well to dig the ground early, and in February to apply lime at the rate of 4 ozs. per square yard, forking it well in. This will sweeten the soil and kill any fungus spores which may be spreading. If preferred, a soil fumigant can be supplied, see Chapter XVII.

After stable manure comes cow manure. It contains about two-thirds the quantity of potash contained in stable dung, and only about half the quantity of phosphoric acid. The amounts of nitrogen and lime are more nearly similar, but they also are below those contained in stable dung. The use of this manure in a fresh state is not recommended for general garden purposes; on a very light sandy, gravelly, or chalky soil, it is not much good using it at all, unless it is fairly fresh and dug in during the early spring, when a dressing will show its effect all the summer. But it is useless to dig it in in the autumn or early winter, for no trace of it will be left in the spring.

Cow dung is heavy stuff in a fresh state, and 4 or 5 cwt. is not too much for a square rod of land. Here again if the cattle are bedded on wood shavings or sawdust the value

of the manure is greatly impaired, and the application of lime or, better still, a soil fumigant *with* the manure is almost essential.

The manure from pig-sties is good for the flower garden, but it is too powerful for use in a fresh state. It contains about one-third of the amount of potash compared with stable dung, and half or rather more than half as much phosphoric acid. It is, however, considerably richer in nitrogen, and contains more, sometimes much more, lime than stable dung. It should never be used on a stiff clay soil, but on light sandy soils it gives fine results. The best way to treat it is to mix the fresh manure with a quantity of lime, soil, or vegetable refuse, and let it lie in a heap covered over with soil for several months. It will then mellow down, and can be dug in deeply. Even so, it is no good for surface work, neither is fresh cow dung; it must be buried at least 12 ins., and can be used at the rate of 4-5 cwt. per square rod.

Sheep manure is of some importance. It is specially rich in sulphur and nitrogen. It can be used in a fairly fresh state, but it is a good plan to mix it with soil or vegetable refuse. It can be used at the rate of two barrow-fuls to every square rod, dug in during the winter. It is better for light soils such as those of a sandy, gravelly, or chalky nature, than for ordinary loams, and should not be used on a strong clay.

Fowl and pigeon manures are very strong to use; 6 to 8 lbs. per square rod applied in the spring is ample. They are useful for all soils and are extremely rich in soluble nitrates and phosphates. The same with guano, though this is more of an all-round manure; 4 lbs. of guano per square rod are usually enough. I do not refer to the several patent artificial guanos, but to the original well-known manure produced by sea-birds.

Blood is a powerful nitrogenous manure, but it is unsuitable for use in a fresh state. The best method of preparing it as a manure is to add 1 lb. of lime to every gallon of blood, stir well, allow to dry, and pulverise. This can be

used at the rate of about 4 lbs. per square rod in the spring or summer and forked in.

In coast places fish is sometimes used as manure. I have had no experience of it, but I am told that it is a powerful general manure. The quantity to apply seems to be a matter of opinion, but I would begin with 20–25 bushels and increase to 30–35 bushels per acre as an experiment. I understand that when it is very cheap, even up to 50 bushels per acre is used, but one should hesitate to use so freely what is said to be so powerful a manure. The time to apply it is, I am told, during the early winter months, dug in deeply in the same manner as ordinary manure.

Bones are a useful manure for the garden. Their chief value is in the phosphate of lime they contain. Sheep bones contain the highest percentage of phosphate of lime and the lowest percentage of animal matter; pig bones contain the lowest percentage of phosphate of lime and the highest percentage of animal matter. Generally speaking it is best to apply them in the autumn in the form of bone-meal, at the rate of about 8 lbs. per square rod. The material is well forked or dug in.

There are other kinds of animal manures and animal products which may be used, but it is not thought worth while to describe them here. Fowl and pigeon manures, guano, blood, and bones are not substitutes for animal manure, but they may be used when a soil already contains enough humus, for spring, or, in the case of bones, for autumn or winter digging.

The Storage of Manures :—There is a lot of waste of animal manures going on all over the country in gardens and on farms alike. Every farm has its dung heap, and every allotment, or nearly every one, has an open exposed manure heap. We see such manure heaps steaming, and we smell their unpleasant odours, but how often does the average man know or think of the frightful waste that is going on. Gases are escaping, which ought to be utilised for fertilising the ground. Salts are being decomposed and dissolved, and gallons of liquids escape from big manure

heaps and are wasted. Putrefaction is a destructive process, but of course we cannot help that. Wherever there is a manure heap of any size, putrefaction goes on, and with it waste of good material unless steps are taken to conserve it.

I wonder very much why horticultural and agricultural societies have not drawn greater public attention to this subject of waste of manures. Perhaps it is because people think it is vulgar and indelicate to speak or write about manure. But the crops we live on cannot be grown without it, our very life depends upon it, and national economy ought to demand that nothing of that sort should be wasted. I am devoting special chapters to the subject because of its importance.

It is wicked waste to let manure heaps drain away into sewers, as is so often done ; and it is scandalous that we do not make use of the millions of gallons of sewage which are produced every year from dwelling-houses. Some of it is used, but only too small a part. Artificial manure makers dry it and sell it at 6*d.* or 1*s.* a lb., but they cannot deal with it as it might and should be dealt with. So the bulk of this valuable manure is pumped into our rivers, or runs into the sea direct, and is wasted. That is one form of waste, and there are many others ; for instance, where big manure heaps are allowed to burn their hearts out and no attempt made to save the liquid draining from them. How can amateur gardeners be expected to avoid waste in this matter if big manure users do not set the example. The amateur is apt to follow the farmer, and say, " Well, the farmer does not bother about his manure heaps, so why should I ? "

In a small garden it is difficult to avoid waste, but something can be done. Animal manures should be kept separate if they are purchased separately, built into conical heaps and well beaten with the spade. If they are to be stored for a long time, the heaps should be turned completely over once a week for a month, and the soil surrounding them should either be mixed in, or be made into

a sloping heap by itself. The rain more easily runs off such heaps, the gases do not escape to the same extent, fermentation is slower, and the manure so treated is much richer.

If the manure is very hot when it is delivered, as is frequently the case with stable dung, a weekly turning will not be enough. It may be much improved by the addition of a quarter of its bulk of leaves and should be turned at least twice a week, for the first fortnight. Then once a week for the next fortnight, after that most of the rank heat will have gone off. The outer portions of the heaps will in all cases be poorer than the inner portions, but that cannot be helped.

In big gardens something more can be done. There may be what is known as a manure yard with a flagged or cemented floor and gutters to carry the drainings into a sunk tub or cemented hole in the ground. The liquid thus collected is periodically pumped up and thrown on to the manure again when it is turned over. The oftener manure heaps are turned over during the first month or so the better, and in all cases they should be built into sloping or conical heaps.

Besides a manure yard there are sometimes manure sheds. These are ideal arrangements for avoiding waste. They are usually built of brick or stone and roofed over, but open all along one side. They must not, however, be used for very fresh manure, or it will become too hot, much of its goodness will be wasted. The manures should be well turned several times, and then stacked in the sheds, where rain and sunshine will, for the most part, be kept off them. Usually such sheds have gutters draining into a sunk barrel, the liquid being pumped up and mixed with vegetable refuse.

Another method of preventing waste of manure is to dig a deep pit in the ground and have the sides bricked up. A pit to hold 3 tons of manure is convenient. This must be 6-8 ft. deep and the size of an ordinary three-light frame. Its top should be nearly covered with corrugated iron

resting on a wooden framework, in order to keep off rain and sunshine. As before, the manure should be well turned before it is thrown in, or it will become very heated and spoil itself. Such a pit is extremely useful. The manure can be dug out as needed and will be fine rich material.

If there is only a piece of ordinary ground at the end of the garden on which to store manure, do not, as is sometimes advised, sprinkle the heap with quicklime, chloride of lime, or sulphuric acid to keep down the unpleasant smell. These materials spoil the manure (except manure from pig-sties which must be mixed with lime). The proper material to use is gypsum or sulphate of lime. This can be sprinkled freely over the entire surface, or even mixed with the manure to prevent loss of ammonia, etc. Some writers advise the watering of spent manure heaps with the impure ammoniacal liquor produced in gas works. Spent manure heaps are those which have been exposed to rain, snow, wind, and sunshine for a lengthy period, have given off most of their ammonia, and have had most of the soluble salts washed out. This advice seems to be of doubtful value, seeing that this liquor frequently contains ingredients which are harmful, if not poisonous, to plant life. Manure heaps should never be allowed to become spent.

CHAPTER XXVI.

ARTIFICIAL FERTILISERS.

THE manures described in the last chapter and in Chapter XXVII are all of organic origin, that is to say, they are all produced by living organisms, either plants or animals. Some of the animal products were, as I have shown, unsuitable for use in a fresh state, they had to be treated in various ways, which, however, did not turn them into artificial fertilisers. After their treatment they retained their organic character, although some of them are at times called artificial fertilisers.

Manures, then, which are produced by living organisms, are called organic manures; and those produced by the treatment of minerals, inorganic manures or artificial fertilisers. These inorganic manures or artificial fertilisers are not complete substitutes for animal or vegetable manure.

I have already pointed out that artificial manures contain no humus, and that so far as I know no chemist has ever succeeded in compounding a mixture which is either humus or a complete substitute for organic manure. However complete an artificial fertiliser may be, it lacks this one and all-important ingredient "humus," hence the results gained by its use without organic manures are often very poor.

There are on the market two classes of fertilisers, one called a simple fertiliser, and the other called by the makers "complete fertilisers." Amateurs are apt to get confused with these. Simple fertilisers are simple chemical substances such as nitrate of soda, nitrate of potash, nitrate of lime, sulphate of lime, sulphate of potash, etc. Super-

phosphate of lime and basic slag are generally included as simple fertilisers though they are really mixtures of several substances.

Fertilisers which are said to be complete are often very incomplete, but at times they may be what they are said to be. For instance, there are two or three kinds of Hop Manures which are useful for the garden, and although they are generally included under artificial fertilisers they are really vegetable manure reinforced with various chemicals. These manures are extremely good and most useful for the garden. Most of them, however, are too expensive and too strong to be used freely; and they are of little use in hungry, sandy soil, which can swallow up tons of humus, and cart-loads of marl and clay to every acre.

More usually, however, the words "complete fertilisers" are misleading. The majority of proprietary fertilisers are only complete in so much as they contain the four elements essential to plant life—nitrogen, phosphorus, potash, and lime. They do not contain the all-important ingredient "humus," which is essential in any truly complete fertiliser or manure. It would be unfair to recommend any particular make of proprietary fertiliser in these pages, and I should get into trouble if I expressed disapproval of any particular make. But I must say a few words, speaking very generally.

I have carefully tried most of the numerous proprietary fertilisers now offered for sale. Some have tempting analyses printed on the packages and some have not. The directions furnished with them have been as variable as the kinds of manure. Sometimes one is directed to use much and sometimes very little.

I cannot say that all proprietary fertilisers or manures which I have tried were good. Some were exceedingly good, and some the reverse. In some cases the lack of good results was certainly the fault of the makers, and in others it may have been that my soil was not the soil they were compounded for. In several cases the ingredients were

not properly ground up and mixed together, a matter of considerable importance.

There are many who are prejudiced against proprietary fertilisers. They have perhaps come across a bad article and they conclude that all of them are bad. That is not so. I have come across some astonishingly good things, and so will others if they have patience to try a few.

The feeling against the use of these fertilisers is perhaps caused by the idea that artificial manures of any kind injure the soil. "I stick to humus," one keen gardener said to me lately. "Humus from animal and vegetable matter. I get on very well without any artificials at all, and if I can I don't see why other folks shouldn't." But the idea that artificial fertilisers poison the soil when applied in moderation is quite a mistake. Overdoses will do so, but ordinary applications may benefit both the soil itself and the plants growing in it. My own work has proved that the application of some of the proprietary fertilisers and some of the simple chemicals are distinctly advantageous, so long as there is humus in the soil; and the experiments of other gardeners on a larger scale confirm this.

There are two ways of applying artificial manures: (1) during the autumn, winter, spring, and summer in a dry state, and (2) during the summer dissolved in water. Most artificial manures, including proprietary fertilisers, are better applied in the spring or summer rather than in the autumn or winter, but there are some exceptions. In applying them in a liquid form always well water the ground first, and then apply the liquid as I have already described under Summer Feeding (Chapter XIX).

CHEMICAL FERTILISERS.

Compounds of Ammonia:—The chemical name for ammonia is ammonium. Its compounds used in the garden are ammonium carbonate, ammonium chloride, ammonium nitrate, ammonium phosphate, and ammonium

sulphate. These are all soluble in water, some more so than others ; they all contain a high percentage of nitrogen, for ammonia is composed of nitrogen and hydrogen. Ammonium nitrate is the quickest acting artificial manure, and must be used cautiously ; 1 oz. per 3 or 4 gallons of water is a good quantity as a liquid manure, and $\frac{1}{2}$ oz. per square yard of soil as a dressing in the spring or summer. It should not be given to plants like Lupins, Galegas, and Sweet Peas ; nor should any other compound of ammonia, unless mixed with other chemicals, except that ammonium phosphate may be applied to Sweet Peas as a liquid manure, using $\frac{1}{4}$ – $\frac{1}{2}$ oz. per gallon of water. Ammonium carbonate may be used as a dressing and as a liquid food in the same quantities as the nitrate. Ammonium chloride may be applied as a dressing in the early spring to beds at the rate of $1\frac{1}{2}$ oz. per square yard. Ammonium sulphate as a dressing, 1–2 ozs. per square yard in the spring and summer, or as a liquid $\frac{1}{2}$ –1 oz. per gallon.

Compounds of Lime :—The chemical name for lime is calcium oxide. The chief compounds useful for our purpose are Calcium carbide refuse, Calcium carbonate, chloride, cyanamide, nitrate, nitride, oxide, phosphate, sulphate, and superphosphate.

Calcium carbide refuse is somewhat similar to slaked lime, but it still contains some unchanged carbide. It is applied to soils more as a cleanser than as a fertiliser in the early autumn, or even as late as February if it has been well exposed to the air first, at the rate of 3 ozs. per square yard. Calcium carbonate is better known as chalk. If it can be got in a crushed state it should be added to light sandy soils at the rate of as much as 60 lbs. per square rod in the winter, and will do untold good. If, however, it can only be got in lumps, spread the lumps over the surface in the same manner as clay or marl in the early winter so that the frost may break them up ; and in the spring rake off any big lumps for application the following year, and dig the rest in. Calcium chloride is of little use to the gardener, except that soils may be watered with a weak solution

once or twice during the summer to lessen evaporation. But what is known as "chloride of lime" is quite valuable if sprinkled lightly on the surface of the ground in the winter and dug in. It acts chiefly as a soil fumigant, but also supplies lime to the soil. Calcium cyanamide is a most useful manure. When it comes into contact with moisture in the soil it slowly changes evolving ammonia, and this ammonia must be changed into nitrates by soil bacteria, in which form it can be used by plants. It also supplies lime in the form of the carbonate to the soil. It can be scattered freely on the surface in the winter or early spring at the rate of 2 ozs. per square yard, or nearly 4 lbs. per square rod, and dug in. Or it may be scattered over the beds during the growing season of plants and watered or hoed in. Owing to the fact that it is only slowly soluble, it is useless to attempt to apply it in solution as is often advertised. It must not be given to Lupins, Galegas, Sweet Peas, etc. Calcium nitrate is a very quick acting fertiliser, coming second only to nitrate of ammonium in the speed of its action. It is very soluble in water and readily absorbs it from the atmosphere, so must be kept in tightly lidded tins. It can be applied in solution only, during the growing season, beginning with $\frac{1}{2}$ oz. per gallon, and increasing to $\frac{3}{4}$ oz. per gallon. It must be kept away from Galegas, Lupins, Sweet Peas, etc. Calcium nitride, which is difficult to get, can be used in a similar manner to cyanamide, but only 1 oz. per square yard or nearly 2 lbs. per square rod should be applied. It evolves a large amount of ammonia and also supplies lime to the soil. The oxide is just "lime." Its uses have already been mentioned several times. It comes in more as a soil cleanser and antidote to sour or humic soils than as a fertiliser. For general purposes apply lime every three years in the winter at the rate of 4 ozs. or so per square yard. For special purposes more may be used. Slaked lime, Calcium hydroxide, is not so suitable for use as quicklime. Old slaked lime can be used at the rate of 5 ozs. or more per square yard. Calcium phosphate is

insoluble in water in its fresh state, hence it must be applied to the soil in the early winter; 2-4 ozs. per square yard can be safely dug in. Sulphate of lime or gypsum is more useful as a cleanser than as a fertiliser. It can be dug in during the winter or spring at the rate of 6-8 ozs. per square yard. Its use on manure heaps has been described in the last chapter. Calcium superphosphate, usually known by gardeners by the name of "superphosphate," is a powerful phosphatic manure, 20-35 % of which is soluble in cold water. It is not really a chemical compound at all, but a mixture of chemicals. Analysis has shown that it contains several phosphates of lime such as mono-calcium phosphate, di-calcium phosphate, and tri-calcium phosphate, and in addition to these phosphates it contains sulphate of lime and sometimes slaked lime. The mono-calcium phosphate is the soluble ingredient, the others are insoluble, or very sparingly soluble. Superphosphate is best applied in the spring or autumn at the rate of 2-3 ozs. per square yard, and dug in. It may be used occasionally in the growing season at the rate of 1 oz. per square yard and forked in. In solution the best method is to put 1 oz. into every gallon of water, stir well, allow to settle, and use the clear liquid. One application of this each week during the growing season is usually enough, but when the plants are very strong it may be used oftener. It gives the best results on a light soil, but there must be plenty of ordinary lime in the soil. Used on a sour or humic soil it is very bad, increasing the acidity. No compounds of lime except superphosphate should be applied to chalky or limy soils, little benefit would result.

Compounds of Iron :—The only one I need mention is sulphate of iron, known as "green vitriol." It is a powerful compound, useful for intensifying the colour of flowers in the borders. A watering with a solution containing $\frac{1}{2}$ oz. per gallon of water is enough. This may be given once a week or once a fortnight during the growing season. Applied to Hydrangeas in pots or in the open ground it will turn the flowers blue

Compounds of Magnesia :—Those sometimes used by gardeners are Magnesium carbonate and sulphate. In solution, 1 oz. per 3-4 gallons of water is usually enough. An application of either at the rate of about $\frac{1}{4}$ lb. for every 2 or 3 square yards in the spring to soils of ordinary loam has been found good, especially in the case of roses. Magnesium carbonate in soils lessens evaporation, and those containing much of it are cold and wet in winter.

Compounds of Potash :—The chemical name for Potash is Potassium. The chief compounds are Potassium carbonate, chloride, nitrate, phosphate, sulphate, and sulphide. The first four are expensive, and the carbonate and phosphate are also inclined to absorb moisture from the atmosphere. Generally speaking, all plants are benefited by an application of potash in some form or other, but potassium nitrate should not be applied at all freely to Lupins, Galegas, Sweet Peas, etc. Potash salts are absorbed directly into the systems of plants by their roots, for potash is found in the ashes of all plants. Hence it is a necessity. Nitrate and phosphate of potassium act the quickest ; they should be applied at the rate of 1 oz. to every 3 or 4 gallons of water during the growing season only. The phosphate is specially useful for Sweet Peas. The carbonate, chloride (also known as muriate), and sulphate of potassium are best applied in the form of powder to the ground, in the winter, spring, or autumn. They may be used on all soils except stiff clays. The rate of application should not exceed 2 ozs. per square yard. Sulphate of potassium can also be used in solution during the growing season at the rate of $\frac{1}{4}$ lb. per 8 gallons of water. The sulphide is more of a disease curer than a fertiliser. Its use has been described in Chapter XVII. Some writers recommend that the soil around plants should be sprayed with it in solution, and it is said to have some fertilising value, but this seems doubtful. I myself advise that it should be kept off the soil as much as possible.

Compounds of Soda :—The chemical name of soda is sodium. The chief compounds used are the carbonate,

chloride, nitrate, phosphate, and sulphate. The carbonate and chloride are known as washing soda and common salt respectively, or simply as "soda" and "salt." The nitrate is known as Chili Saltpetre, to distinguish it from potassium nitrate which is called saltpetre, and the sulphate goes by the name of Glaubers' Salt. This last is similar to Epsom Salt (sulphate of magnesium), and can be used in the same way. The carbonate can be freely scattered over sour soils in the winter, and dug in, but it must be well pounded up first, and not applied in the lumpy state in which it is purchased. It neutralises acidity to some extent but not so well as lime. The chloride is more useful as a soil cleanser than as a fertiliser, and land can be dressed with it at the rate of 1 oz. per square yard in the spring, but it must be kept away from Hollyhocks. The nitrate can be forked into the soil in the spring or summer at the rate of $\frac{1}{2}$ –1 oz. per square yard, or applied in solution 1 oz. in 2 or 3 gallons of water, but it must be kept away from Galegas, Lupins, Sweet Peas, etc. It is inclined to deliquesce, so should be stored in good tins. Lastly, the phosphate can be applied to Sweet Peas or general plants during the growing season at the rate of $\frac{1}{2}$ oz. per gallon of water.

Basic Slag :—This is not a simple fertiliser. It supplies lime and phosphate to the soil, and sometimes contains iron oxide. It is only very slowly soluble in water, so that it is essential that it should be applied in the early autumn to obtain good effects in following summer. It gives better results on a heavy soil, but may also be used on a medium or light soil. About 4 ozs. per square yard can be applied and dug in, and it may be sprinkled on lawns at about the same rate.

Kainit :—This is a double chloride of magnesium and potassium. It must be applied in the early autumn at the rate of 4 ozs. per square yard. Scatter it on the surface of vacant land, and let the rain wash it for a few weeks; then dig it in. It is more useful on light soils than on heavy ones, but can be used for both.

Soot :—This consists mostly of carbon, with a small percentage of ammonia; 15 lbs. per square rod can be applied during the spring or summer, and forked in, a calm day being chosen for the work. Or it may be used for dusting over plants, and the soil surrounding them, to ward off the attacks of pests. Soot water is made either by putting 1 peck of soot directly into about 36 gallons of water and stirring well; or by putting this quantity into a coarse bag and suspending the bag in a tub or barrel containing the water. Soot water is a very safe liquid manure. It can be applied freely and frequently to most plants during the growing season.

Wood Ashes :—These form an exceedingly valuable but incomplete artificial fertiliser. With wood ashes gardeners always include the ash produced by burning all vegetable rubbish such as shrub prunings, hedge clippings, unrottable plant remains, as well as seeding and long rooted weeds. The chief constituent, however, is carbonate of potassium, with other valuable mineral salts. Wood ashes are a potash manure, but they must be applied to the ground in a dry state and never in solution. They can be used any time in the spring, summer, or winter, forked or dug in; and are useful for any kind of soil. Apply at the rate of about 6-8 ozs. per square yard. Wood ashes should be collected from the remains of the bonfire as soon as they are cold, and sieved to remove stones, sticks, etc. They should be stored in boxes in dry sheds: if they get damp or wet they will be spoilt. Coal and furnace ashes are not so rich in fertilising materials, they are best employed as already described for mixing with the clay of heavy soils to break it up and improve it.

Manufactured Guanos :—These are not the same as the natural guano referred to in the previous chapter. But many of them are extremely good, and "complete" in so far as they contain phosphates, lime, potash, and nitrates. They are good all-round fertilisers, and are supplied with printed directions which vary with different makes

SOME SIMPLE FORMULÆ.

I do not propose to refer to the many other "complete" fertilisers by name, but to give here a few recipes for making fertilisers at home. It must, however, be understood that the results to be expected from the use of them may not be so good as from some of the "complete" proprietary fertilisers. The reason is that it is not possible at home to get that intimate admixture of ingredients which manufacturers are able to do with proper machinery for the purpose. But some manufacturers take too little trouble over this very important point, and in such cases we can obtain better mixtures by our own labour.

Moreover, manure manufacturers can obtain and use materials which are out of the reach of private individuals. With a bigger choice of materials better manures are possible.

The essential ingredients of manures are, as we have seen, potash, phosphates, nitrogen, and lime, but if the fertiliser is to be a stimulant only, one or two of these may be omitted. The characteristic effects of potash and phosphatic manures are the production of more flowers; and of nitrogenous manures the production of more leaf and stem. All nitrates described in the preceding section, as well as all ammonia compounds, encourage leaf production; potash manures (except nitrate of potash) and phosphatic manures (except phosphate of ammonium), encourage flowers. The two exceptions encourage both leaves and flowers.

(1). A good Lawn Manure.

Basic Slag (ground fine) 3 lbs.

Kainit (crushed) 2 lbs.

Mix well, and apply in the autumn at the rate of 4 ozs. per square yard. This manure may also be dug into vacant flower borders in the autumn or early winter.

(2). A Good "Complete" Fertiliser.

Nitrate of Soda 3 ozs.

Nitrate of Potash 2 ozs.

Phosphate of Lime (superphosphate) .. 6 ozs.

Mix well. Scatter lightly on the ground during the growing season and water in, or use at the rate of $\frac{1}{2}$ oz. to 1 oz. per gallon of water.

(3). A Simple Fertiliser.

(I am indebted to a friend for this recipe and for permission to publish it in my book.)

Superphosphate of Lime 1 lb.

Nitrate of Soda (dry) $\frac{3}{4}$ lb.

Apply in solution 1 oz. per gallon of water once a week during the growing season.

(4). A Fine Fertiliser.

Sulphate of Ammonia 6 ozs.

Phosphate of Potassium 1 oz.

Nitrate of Lime 2 ozs.

This is chiefly a nitrogenous manure. It can be applied to hasten the growth of plants. Use $\frac{1}{2}$ oz. per gallon of water.

(5). Another Simple Fertiliser.

Nitrate of Lime (dry) 6 ozs.

Phosphate of Potash (dry) 3 ozs.

Begin by using $\frac{1}{4}$ oz. per gallon of water and increase very gradually if necessary.

(6). A Phosphatic Fertiliser.

Phosphate of Sodium 1 oz.

Phosphate of Potassium 1 oz.

Superphosphate of Lime 6 ozs.

Mix well. Can be applied at the rate of $\frac{1}{2}$ oz. per gallon. Useful for most plants. A powerful manure.

(7). A Potash Fertiliser.

Sulphate of Potash 4 ozs.

Nitrate of Potash 2 ozs.

Phosphate of Potash 1 oz.

Mix very thoroughly. Can be applied at the rate of 1 oz. for every 2 or 3 square yards of soil in the growing season or given in solution, starting with $\frac{1}{4}$ oz. per gallon and gradually increasing. This is a powerful fertiliser.

(8). A Carnation Manure.

A gardener who grows good carnations has given me the following recipe which he finds is a good manure.

Nitrate of Lime 2 parts.

Nitrate of Potash 2 parts.

Superphosphate of Lime 7 parts.

He applies it during the growing season in solution $\frac{1}{4}$ oz. per gallon, or in the spring gives a dressing of it 1 oz. per square yard.

(9). A Winter Manure.

Basic Slag 4 lbs.

Calcium Cyanamide 2 lbs.

Kainit (dry) 2 lbs.

Mix well. Lightly scatter this over the surface of the ground in December or January and dig in; 2 or even 4 ozs. per square yard can be used.

CHAPTER XXVII.

VEGETABLE HUMUS.

IN the chapter on animal manures I explained that humus was the "product of complete putrefaction of animal or vegetable refuse." "Vegetable humus," therefore, is completely rotted vegetable matter. When the process of putrefaction is complete there is left a black "fatty" material, not very different from animal manure. In practice, however, the material is dug in before the putrefaction is complete, but it generally goes by the name of vegetable humus or vegetable manure.

For some years I have been carrying out experiments with rotted vegetable matter, and at the time of writing my latest experiment is just complete. Most of the trials have been done in my vegetable garden, but some have been made in the flower garden, and the results of these may perhaps be of interest.

The reasons for making the experiments were:—(1) The increasing difficulty in getting stable dung; (2) To show that humus is supplied to the soil by vegetable matter; and (3) To discover whether the humus contained in rotted vegetable matter is as good as the humus supplied in animal manure or to find a way of making it as good.

I have been able to prove that humus is supplied by vegetable refuse; that it is very nearly the same as that supplied by animal manure; but up to the present I have not discovered a method of treating it by which the results obtained are quite as good as those obtained with animal manure. It is very nearly but not *absolutely* the same, so that it cannot be used alone for an indefinite period

without the soil deteriorating. I have tried mixing it with all kinds of artificial manures, but up to the present have not obtained completely satisfactory results. The vegetable manure seems greatly improved by the addition of phosphate, and the material which has given the best results in this case is basic slag. At present one is bound reluctantly to admit that vegetable manure is not an absolutely complete substitute for animal manure; but it can be used for several years in place of it, at the end of which period a good dressing of dung should be given. Where dung is scarce the garden can be divided up into sections, one section being dressed each year with dung, the others with vegetable manure; in this way every part of the garden will get enough animal manure to prevent soil-deterioration.

Experiments have been made on the following points:—
(1) The best materials to use for making vegetable manure; (2) The best way of making it; (3) The best time to use it; and (4) The best method of using it. These points are dealt with separately.

The Best Materials :—Generally speaking, the softer the material the better. Soft plant remains from the borders, soft seedless weeds not possessed of tap-roots or spreading stems, and grass cuttings of all kinds, especially lawn mowings, make the best manure. Harder plant remains and weeds can be used, but the manure is not so quickly made.

If, however, the amateur has a vegetable garden, he can use the remains of most vegetables, except cabbage and artichoke stumps, and roots of potato plants, for making vegetable manure.

How to Make it :—There are two ways of making vegetable manure. The first is the quickest, and good vegetable manure can be made in a single day by it. The refuse to be treated is well turned over with a fork and sprayed generously all the time with water. A fire is lighted in the garden and got well going with dry garden rubbish. The refuse is then piled on to the fire quickly in such a

quantity that burning is stopped at once. What happens is this. The material "sweats" and heats up to such an extent that decomposition sets in, and by the following day it can be safely dug in if buried deeply. If the material is weeds and plant remains, a little lawn mowings mixed with it will assist the changes. Lawn mowings alone is quickly turned into manure, if only put on to a small fire.

This method is a good one but it is not so good as the following: If possible a pit should be dug, the soft material shot in, after throwing plenty of water over it. If a pit is not available, then make a stack of the material in an out of the way part of the garden. Turn it over every fortnight if time can be spared, and add basic slag during the first three turnings. If it is slow to rot, spray it with water. It usually takes two or three months to make decent vegetable manure by this method, but when it is made it is rare good stuff.

A variation of this method is possible in some gardens, but it is not often practised. It consists of watering the vegetable refuse with drainings from cow sheds, stables, or manure heaps, or with strong house slops. This method is usually only practicable where the manure is made in heaps and not in pits, and more often these valuable liquid materials are wasted. The watering should be given once a week, and the heap completely turned over and the manure well mixed. Basic slag and sulphate of lime can be scattered over the material meanwhile, and will improve it. In this case good vegetable manure, with some animal ingredients, can be obtained in six weeks or even less.

Lawn mowings or long grass quickly heat up, if left in a heap, especially if they are wet. They form a very good vegetable manure, and can be used for most flowers. In a fresh undecomposed state they may be sparingly dug in, but in a rotted condition may be applied generously at the rate of 5 cwt. or more per square rod. But it will be well to explain what well rotted means. After a very few days they are rotted into manure, but it is not safe to use them at once. The mowings should be left alone in their heaps

unturned for at least a month, when the outside portions can be skimmed off and the inner material broken up with a fork and used as manure, with or without the addition of basic slag.

When and How to Use it :—So far as my experiments go I have come to the conclusion that the best time to use vegetable humus or manure is in the winter. It can be dug in during the autumn, but if left till the spring it must be in a very well rotted state. During the winter, however, it can be applied to vacant land in a fresher state ; it is more beneficial then, since the final stages of decomposition take place in the ground.

I have used vegetable manure in trenching, deep digging, and shallow digging, and have gained good results in every case. The rougher forms are more suitable for trenching work ; and the finer forms, made from grass mowings and small weeds, for surface and ordinary digging. In a very rotted state it can be forked into existing borders around the roots of plants, and can even be used for mulching. In my garden the soil is inclined to be heavy, but I know several gardeners who use it extensively on light soils with splendid results. It tends to break up and improve a clayey soil, and to strengthen and bind together a sandy soil. In the winter digging it can be used fresher in light soils than it is safe to do in heavy soils ; lawn mowings which have rotted for only about four weeks can be used on sandy soils. In soil which is devoid of humus, this necessary ingredient can be supplied first with vegetable manure and finished off with dung.

One point, however, must not be overlooked. Rotted vegetable manure must not be buried in the soil in big lumps. Sometimes it is awkward stuff to manage, more so than animal manure ; it should be broken up with a fork to do the good it can do. People with weak constitutions should rely on animal manure ; it is less smelly to use, and need not be above the soil so long, and those who use it are advised to have a solid meal before working with it.

SOME USEFUL ADJUNCTS.

In addition to vegetable humus made as described, there are several forms of material which are useful adjuncts to soils, including peat, road scrapings, tanners' refuse, spent hops, leaf-mould, and seaweed. They are not commonly known as Vegetable Humus, but they are all forms of it.

Peat :—Peat is not nearly so much in demand as leaf-mould, but it has its own good uses in the garden. Mixed with loam it is used for potting. Plants of the Heath tribe, and hard wooded shrubby plants, do best when potted in a mixture of peat, leaf-soil, and sand. Out of doors, Rhododendrons, Azaleas, Ericas, etc., etc., may well be grown in soils containing peat, and White Heather from the moors grown in rock-gardens should be given peaty soil.

Peat is formed on wide tracts of moorland, and is produced by rotting Heather plants in excessive moisture. The water is kept on the surface more or less by a layer of matter called "pan," which is also impenetrable to the plants' roots. Successive layers of vegetation grow and die and become partly decomposed ; marsh gas is evolved, the vegetable matter does not completely rot, and peat accumulates.

Peat may be dug from pits or from just under the heather on the moors in many parts of the country. It should not be dumped on to garden soil at once ; but if it can be tipped into a yard and dealt with as follows, so much the better.

Break up the biggest lumps and pick out any pieces of stick, heather stem or root, and other rubbish. Then wheel it to some sheltered corner or preferably into an open building, and stack it high so that the water may drain away. This water is always acid and sour. After drying, it can be wheeled on to the borders for Rhododendrons, etc., and dug in, with or without stable manure. Or it can be used as a mulch over the roots of these plants. For potting purposes, put it through a $\frac{1}{2}$ in. sieve and mix with equal parts of loam or leaf-soil and about half a part or less of

sharp sand. Many rock-garden shrubs like a sandy mixture of loam and peat or peat and leaf-soil.

Peat contains a high percentage of water, so that it is important to allow an interval of some weeks for it to dry. It must be used with great discretion in the mixed border, as many flowering plants dislike it. The dried peat briquets cut for fuel are no good for the garden.

There is a way of treating peat by which a valuable vegetable manure is formed. It must be well broken up and lime and bone-meal added. I have not space to give the details here, but those interested should refer to the *Gardeners' Magazine*, February 19th, 1916, page 85, where I dealt with the method of working at some length.

A word must be said here of Bacterised Peat which is now being sold in large enough quantities to justify its being included as a form of vegetable humus. Up to the present the results of its use have been variable. Experiments have not given sufficiently good results to warrant its being used extensively as a manure. Careful trials of it by people all over the country will show its true value; it is a subject for much future experimental work.

Road Scrapings or Sweepings:—Now that the roads are tarred or "salt-sprayed," many gardeners are dubious of using road scrapings or sweepings for their gardens, so perhaps my own experience with these materials may be useful.

Road scrapings or sweepings from country lanes and roads untarred and undressed with "salt," are the best to use, but of course they are not now so easily obtainable.

Those from roads sprayed with "salt" (calcium chloride) are not only good for lightening soils, but have a stimulating effect if put round each plant, or scattered on the garden in the summer, and hoed and watered in.

Road sweepings from tarred roads cannot contain very much tar, even assuming that it is injurious to plants, but to test this point I made some experiments a few years ago with fine asphalt, which contains a great deal of fresh tar. I dug this in freely on a plot of land in the winter of 1913,

and throughout 1914 I found that plants of various kinds thrived on it very well indeed; moreover, it kept the pests down remarkably well. At the same time I experimented with scrapings from tarred roads, digging them in freely, and here I also found that plants grew very well. All my experiments with sweepings from tarred roads indicated that this material is as valuable as heretofore, and harmless so far as tar is concerned to all except delicate plants. It is the oil and grease from motor vehicles which is harmful.

The time to collect road-scrapings is in the summer or autumn. Stipulate with the road-man that he should avoid oil and grease but should collect as much manure and road-edgings (turf) as possible. In the autumn the sweepings will not be quite so rich, but will contain a quantity of tree leaves as well as manure, and if the road-man has been burning some of the leaves, the "scrapings" will contain the ashes which are rich in potash and most improving to the "scrapings."

The main constituents of road scrapings are fresh horse and cow dung, hay, straw, grass, turf edgings, and leaves. They may be dug deeply into the ground for summer crops at once, but it is better to stack them in a corner away from trees to decompose and become mellow. They are inclined to ferment, but that does not matter. Slops may be poured into a hole in the heap in dry weather to assist decomposition, and the heap may well be turned over once or twice during the summer months.

When collected in the autumn, the material should be stacked for about a month, and then it can be dug in deeply, or used for manuring the lower spits in trenching.

Tanners' Refuse :—This consists chiefly of bark, and is not nearly so valuable for the garden as some suppose. It can be mixed with equal quantities of animal manure or soft garden rubbish and, after mellowing down for a month or two, dug into the garden.

Spent Hops from the Brewery :—These are not much good alone, but if a quantity can be had cheaply and ordinary

manure is scarce, the opportunity of using them should not be missed. They should be shot on to a piece of vacant ground and the heap turned completely over, well breaking up the lumps with a fork; this is important. During this process basic slag can be scattered over them. In this way fine material will be obtained for digging in during the winter. Use 4 cwt. per square rod.

There are two other good ways of improving them. The first is to soak them well with house slops, or to water them with drainings from stables, cow sheds, etc., while the heap is being turned over and broken up. The other is to mix them with half, or their own bulk of semi-rotted vegetable refuse. The mixture of spent hops and vegetable refuse should be stacked in a heap, turned over once or twice, and in a month or two will become fine manure for digging in. Use 4-5 cwt. per square rod.

Leaf-Mould :—This is usually too precious to be dug freely into flower borders, but is reserved for very choice plants. It is largely used mixed with loam as a potting soil. If, however, there is an ample supply it may be dug into the top spit of flower borders during the winter or spring, either alone, or mixed with an equal bulk of stable dung. It can be applied at the rate of 3-4 cwt. per square rod, and is useful on all soils except humic ones.

Leaf-mould must, however, be well prepared, that consisting of half-rotted leaves is not nearly so good, though it may be mixed with dung or vegetable refuse and dug into the second spit.

There are several ways of making leaf-mould, of which I give two. The first is to provide a pit at least 5 ft. deep, the other measurements depending on the amount of leaves to be treated. Shoot the leaves into this pit as they are collected, sprinkling a little lime over them. Tread them well and leave for about a year. Then remove the top few inches first, to be returned to the pit, and dig out the other material. Mix it well together, again sprinkling it with a little lime unless it is to be used for hard-wooded shrubs such as the Rhododendron. The pit is then ready for the next

season's leaves and the leaf-mould can be made into a sloping heap till required for use.

The second method is as follows : Collect the leaves in a corner out of the wind, if possible, and when they are all swept up for the winter, make a heap of them away from tree roots. Lime may be sprinkled over them ; they should be trodden as hard as possible, and covered with soil or manure for a few months. This can then be raked off as the leaves will have consolidated to a large extent. The heap should be turned over frequently during the year, lime being sprinkled on the material each time ; and after turning, a little soil can be thrown over it again to prevent its being blown about. By August of the following year it should be fit for use.

All leaves are by no means suitable for making leaf-mould. Oak and Beech leaves are best, next come Elm and Lime leaves. Poplar, Plane, Sycamore, Walnut, Ash, and Chestnut leaves should not be used. They do not rot into good material, and those of the Plane tree will hardly rot at all. They should be burnt along with shrub leaves and pine needles.

Seaweed :—In gardens near the coast, seaweed can be used as a manure. In its fresh state it is unsuitable, but if stored in open heaps for several months, it will rot into a valuable material. It can then be dug, well buried, into the flower borders or mixed with an equal bulk of rotted stable dung.

Another way is to mix the fresh seaweed with an equal part of fresh fermenting stable dung and throw into a heap. This should be well turned occasionally and in the course of a month or so will form valuable manure.

In conclusion I may add that in no case have I found that vegetable manure increases soil pests or plant diseases. Perhaps that may be because I do not use it in a fresh state. The turning over, breaking up and mixing of the material is most important ; if not done the use of vegetable humus may be harmful.

CHAPTER XXVIII.

THE CARE OF TOOLS.

IF garden tools are to last, they must be taken care of. This is obvious, but how often is it acted upon by amateurs? A peep into the potting sheds often discloses tools hung up dirty with soil, hoes and forks going rusty, and other signs of lack of ordinary care. Good tools can easily be spoilt by a few months of bad treatment or improper use.

Good tools are necessary for success, and to get the most out of them they should be well looked after. All should have the earth brushed off as soon as they are brought in from the garden, and be wiped dry with a cloth. Rakes are rather difficult to wipe with a cloth, so an extra brushing may serve for cleaning and drying.

When hoes and iron rakes are put away for the winter they should have oil rubbed over their iron parts. The prongs of forks and the blades of spades can have a very little oil rubbed over them each time they are brought in after winter digging. Shears should always be well cleaned, dried, and oiled after use, and they should be frequently sharpened. Secateurs should be kept clean, and so should garden knives.

The scythe should be well oiled and sharpened up after use.

Watering cans should have a coat of paint in the winter months if they require it, and any small leakages soldered up.

Turfing instruments should be kept bright. If they once go rusty they become hard to use.

All large tools should be hung on nails in the wall of the potting shed so that they can be easily reached.

Small tools can be kept in a drawer, provided they are not piled on top of each other. These small tools include secateurs, garden knives, trowels, and small hand-forks. There should also be in the drawer a hammer or two, and a garden mallet; spare "roses" can also be kept there if they cannot be screwed on to the sides of the watering cans.

The lawn mower is a garden appliance of which great care should be taken. After use it should be well cleaned, and if this cannot be done in any other way it should be done by pouring water over the parts from the spout of a watering can. The parts should then be well dried, the machine oiled, and put away. When finally put aside for the winter, the blades and working parts should be generously smeared with oil.

Pots and seed pans should be well scrubbed inside and out during the winter days, when nothing much is on the go in the open garden. They should then be arranged in single rows to dry, after which they can be stacked up. Seed boxes should be well scraped inside, and turned over that their bases may be also scraped. They should have a coat of paint, each year if possible, on the outside; paint inside is not generally advisable.

Labels for the open ground or for seed boxes and pans or pots can be cut out of the thin wood of old boxes, but unless there is nothing else to do, it is hardly worth while, for they can be obtained so cheaply. Labels want renewing at least every two years, once in twelve months is better. They should be "painted," that is, have a little white paint rubbed on with a bit of rag, and written on while still wet. Very little paint is needed. Any excess makes writing difficult.

Ordinary portable wooden frames should not be allowed to stand in the open when not in use, but taken to pieces and stored in a shed. Frames should be painted every two or three years with three coats of paint. The lights of frames should be overhauled once a year, any damaged

panes of glass renewed, and holes or cracks filled with fresh putty. A coat of white paint inside and out is good for frame-lights every year.

Glass Cloches should be well washed with water containing "soda," after use. They should then be rinsed in clean water, and stood out to dry. They should be carefully piled in small "stacks" in some place where they will be safe; an accidental blow may break a whole stack.

CHAPTER XXIX.

EXPERIMENT IN GARDENING.

I HAVE referred in many places to the results of experiments which I have conducted in my own garden. And the purpose of the present chapter is to urge all readers to try experiments. "Experiment in gardening" has been for some time my "pet" hobby, and it is not often that a year goes by without it.

I have been fortunate in having opportunities of discussing the subject of Experiment with many gardeners, professional and amateur. Now it is a fact that a large proportion of gardeners never make experiments at all, and when asked why, reply that they regard experiments as waste of time, labour, and money, and that results of any value cannot be got by ordinary people like themselves. Or perhaps that they are not scientists; that they do not understand scientific methods; or that it is impossible to get results in a single year which are worth the labour expended upon them.

Having had a good dose of the work myself, I am able to speak from experience, and as regards results, it may be necessary to continue for several years. But why not?

Patience is a virtue; no experiment can be conducted without it. Some of my gardener friends tell me that their patience will last out for a year, but not longer. They may be on the verge of getting some interesting result, but after the twelve months they "throw the thing up and go back to ordinary gardening again."

Not very long ago I was reading an interesting book by Mr. W. S. Harwood, entitled "New Creations in Plant

Life," dealing with the life and work of Mr. Luther Burbank, the great American botanist. I could not help noticing the patience required of him for the execution of even a single complete test. We can all of us take a lesson from that great man, who has by patient work and experiment given to the world some of the most beautiful flowers and most wonderful fruits and vegetables. If he had not exercised a great deal of patience in his investigations and experiments the world would not have had these wonders. It is possible that if we also have a little patience, the world may be richer by our efforts.

A candid critic once said to me: "Oh, well, it is all very well for you; you make 'copy' out of the results; but it is different for ordinary amateur gardeners; they have no particular interest in experiments, so why should they waste their time upon them?" But I started experimenting without any thought of "making copy." I started for the interest of the thing, and I have continued because of the interest of the work, and this is just what others can do as well. My experiments have been carried on solely for the sake of their great interest.

Try a few experiments and see how absolutely fascinating they are. It may seem dull enough to make up your mind to discover for yourself whether vegetable manure is a full and complete substitute for stable dung; but once start and you will realise how interesting it really is. It may appear dull to think out some experiment to find out the likes and dislikes of a plant. But get started; try a few things, take notes and compare them, and you will soon see that there is more in it than at first appears, and that it is full of captivating possibilities. A game of football is dull enough when one only thinks about it, merely a few men or boys kicking a ball about. But go and watch a game and you will soon see that there is a great deal more in it than you thought. Experiments which at first appear dull, are not really so, but full of adventure and discovery.

Experiments can be conducted at any time—in spring, summer, autumn, or winter. Some are more suitable for

the summer, as, for instance, those on the use of liquid foods, while for others, such as those with soil fumigants, the winter is the best.

The arrangement of an experiment calls for some little careful forethought and plan, in regard to the matter to be investigated. By way of illustration I will take the question of the relative value of different manures or soil fumigants, and describe my own method ; which, however, does not differ from others.

Two or three similar plots are prepared, and at least twelve similar plants carefully selected to be grown under similar conditions, except as regards manure in each plot.

The plots should, if possible, be at least 1 ft. from each other, and before any dressing is applied, the soil in both must be of a precisely similar nature.

Except for the manure or fumigant, the plots are then all treated in precisely the same way, and at the same time. When the manure or fumigant is forked into one plot, the other plots are also forked over the same day, with perhaps some other manure for comparison, or it may be without any at all ; but their mechanical treatment, that is the forking, must be the same. When the plants are set in one plot, they are set in the others at the same time ; and they are selected as nearly as possible of the same state of growth and vigour. When one plot is hoed, the same operation is carried out in the other plot or plots. And the same with weeding and watering. The essential point throughout is that all the plots, whether there are two or more, shall receive precisely "similar" treatment in everything but that one in each plot which is the subject of the test ; the object being to compare results between the plots with reasonable certainty that any marked differences between them may be ascribed to the one thing in which their treatment was not similar.

The objects of such experiments may, of course, differ very widely. They may be to ascertain the effects of different manures, or of different quantities of the same manure, or of different treatment, such as hoeing, or water-

ing, or summer feeding, or cutting. But whatever the object is, the one essential point is to treat all the plants similarly, except only in regard to the object of the test. Unless care is taken to do this, the value of the experiment would be greatly reduced, and the results even misleading.

Careful note-taking is of great value, even if it is not essential. It is a good plan to leave a few pages in your Garden Diary for particulars of experiments. On the left-hand page record the results obtained on the plot not treated, or the plot treated with ordinary material, the effect of which is known; and on the right-hand page record the results obtained on the plot treated with new material, the effects of which are not known. In the case of trying two or more new materials the same method can be used, putting each on a separate page. This method I have found by trial is a very good one. Comparisons are easy and all the particulars are kept separate.

In the case of small experiments it is not necessary to take down many particulars. The date when the experiment was started, the amount of material given per square yard, the plants used, the date on which the first results were obtained, and what the results were, are usually sufficient. But in bigger work the following points should be noted:—

- (1) The kind of soil in the plots.
- (2) The kind of manure used and its quantity per square yard.
- (3) Date the manure was dug in.
- (4) Weather conditions for the week preceding the date of starting Experiment.
- (5) Date of starting Experiment (such as giving dressing of soil fumigant or artificial manure, and amount per square yard).
- (6) Weather conditions for at least 14 days after dressing.
- (7) Date of planting the plots.
- (8) Names of the plants used.
- (9) Particulars as to treatment after planting (*i.e.* hoeing, watering, etc., etc., with dates).

- (10) Date when plants in different plots began to differ and in what respect.
- (11) Particulars at least each week for each plot on the growth of the plants.
- (12) Date when the Experiment was ended. Particulars of final effects, and of any sudden change of weather conditions during the trials.

At the end of the Experiment summarise the results and compare those of the several plots. In the case of manure for instance, it will then be possible to see its effect and to judge whether it is good enough for future use.

Subjects for experiments are extremely numerous, but many of them are rather difficult to begin on. Small experiments are the best to start with: trials of some of the simple single-chemical manures mentioned in Chapter XXVI with different plants prove extremely interesting, but in every case there should be a "control" example, *i.e.* plants not dressed with the manure at all, or dressed with a manure the effects of which are known. As readers gain experience, learnt by careful painstaking experiment, they may begin compounding for themselves "complete" fertilisers, and try their effect on the plants in their flower borders.

Experiments with soil fumigants have already been mentioned. Those used may either be home-made or proprietary articles. Very interesting experiments can be made also with proprietary fertilisers.

Experiments like those which are concerned with humus and the soil are not so simple; but there is plenty of work for anyone interested in this subject. There are many problems to be solved, but most important of all is the one outlined in Chapter XXVII—how to turn vegetable manure into a full, perfect, and complete substitute for stable or other animal manure.

Many more subjects of investigation might be mentioned, but my main object has been to indicate how absolutely fascinating even simple experiments are, and to induce some of my readers to try them themselves.

CHAPTER XXX.

THE GARDEN AND THE SEASONS.

It may seem hardly necessary to include a chapter on The Garden and the Seasons in this book as well as "A Garden Calendar," but having already published a series of articles on the subject I have been urged to include them here. They were contributed during 1914 and 1915 to *Amateur Gardening*, and I wish to acknowledge the kindness of Messrs W. H. & L. Collingridge, the Proprietors and Publishers, in permitting me to reprint them, with one or two small alterations.

"SPRING IN THE GARDEN.

"By the time this article can appear, spring, with all its glories, will be well upon us, and I am tempted to write a few notes on the season, in case they may be of interest.

"My first remarks are on the happiness of spring. Everything begins to wake up from its winter sleep, and our border plants take new life and soon grow strongly. The birds sing, the sky is clear, the days are warm and sunny, and one feels what a good thing it is to be alive. Ah, yes! Spring is always a happy time, and the happiness is such that worldly things cannot mar it. Joy is everywhere in the air in the spring-time. One cannot look at the beauties which Nature daily unfolds to us without feeling this. Many readers, no doubt, will be feeling the troubled times brought about as a result from the war, but let them take heart now the spring is coming on, and let them put zest into their gardens, for a lovely garden can cheer many dark hours.

"Spring is such a lovely time, too, in the garden, and especially in an orchard. Fruit trees when in blossom in a large orchard make one think of Heaven. And the flowers, too! We have the *Doronicums*, the early *Iris*, the *Candytuft*, the *Arabis*, the *Aubrietia*, a host of rock-plants in bloom, not to speak of the bulbs, the *Wallflowers*, and other 'bedded' out flowers which adorn our beds in the spring.

"Some say they think that spring is the best time in the whole year in the garden, but to me spring is a leading-up from beautiful things to more beautiful things, and from happy times to more happy times. To my mind, the garden in summer is far nicer than the garden in spring, for I cannot forget the many happy evenings I have spent walking round amongst the flowers when the day's work is done. Spring is a leading-up to the superlative height of summer. Itself, it is only 'comparative.'

"Spring is always a busy time in the garden, but it should not be made 'too busy.' Amateurs should remember that spring work means summer results. These results may be good or bad. So take time over your work. Time to think out properly what you are doing. I notice recently many writers have given articles containing practical suggestions for the planning and planting of summer beds and borders to get good effects. While readers will do well to try some of these, let them not forget to try a little 'by themselves.' If they take sufficient time and care in the positions of sowing or planting they will get good effects. Hurried work never pays, for what is done in the spring has usually to last all the summer.

"So let not your spring be 'too busy.' Work at your garden by all means, for there is nothing nicer, but think when you work—think how it will all look after a month or two. Make the most of the spring, too, for its precious hours soon slip by and are gone, and nothing is worse than to find oneself with spring work still undone at the end of May. I am not quite clear when summer is supposed to begin, but when we get to the middle of April, or into the

third or fourth week, it may be that some things which have not been done at the proper times, may be best not done at all."

" THE SUMMER.

" Doubtless there are many readers who have been looking forward to the summer, and now it is here perhaps some few notes on how it may be used will be of interest. It has been said by many people that the entrance into July completes most of the gardener's work, but it is not an uncommon thing for people to make statements on subjects they do not know much about. There is still plenty of practical work for the gardener in the way of sowing seeds of perennials, keeping the plants tied up, and the borders hoed, mulched, and watered ; but the amateur will find there is much less strenuous work to occupy him in these lovely summer evenings.

" The amateur will now have time for observation in his and in other people's gardens. If he uses his eyes, and observes accurately and closely, he will find there is much to be learnt. Even the weeds in our rubbish corner, and those by the roadsides should not be scorned, from some of them many interesting points can be deduced. He should look at the Groundsel and compare it with the Jacobea. He will see several points of similarity, of habit, and that both plants are not afraid of dry weather. If he is a Yorkshire dalesman—let him compare the wild globe flower with the garden one, and he will see that they are similar. In this case the garden variety is, I believe, a ' highly bred ' form of the other. And so he could go on observing, and comparing wild flowers with the garden forms. Such comparisons he will no doubt find interesting.

" We have all longed for our favourite flowers and plants to come into bloom, and at the time of writing many of them are looking very well. In the summer it is not only worth while, but, in many cases, necessary, to give a little study to the various plants. Those who describe plants for the gardening Press know this well enough, but the amateur

will do well to study his plants, together with their fads and fancies, even though they may not be new varieties, and irrespective of the fact that he does not wish to describe them. Much can be learnt by the study and comparison of plants and flowers.

“He should first study the plants themselves—their leaves, stems, flowers, and even their roots, though this can only be done in the autumn. He will then obtain many interesting facts. As his interest becomes the greater, he will divide flowers and vegetables into groups, and will, by that means, learn a good deal of botany. Naturally, he will group all, or nearly all, the plants of the cabbage family together, even cauliflowers, radish, turnip, and kohlrabi with them; and, if he adds to this list the following flowers, he will then have in his mind some of the members of the order *Cruciferæ*, or cross-bearers. The flowers I refer to are: Stock, Rocket, Honesty, Wallflower, and *Isatis*. Then, as he looks over his Carnations, etc., he will make them head the following list of plants: Carnations, Picotees, Pinks, *Dianthus*, and *Viscaria*. Among the *Chrysanthemums* he will place Asters, Marguerites, and the maximum sorts; among Poppies, the annual sorts, *i.e.* Shirley and other named varieties; the perennial kinds, and also the *Eschscholzia*. These classifications are rough and ready, possibly not very accurate, but still convenient in the long run. No attempt has, of course, been made to give complete lists of any of these groups, or to divide them up into botanical sections. This would take us too far. And there are many other groups into which garden plants fall; but these the reader must find for himself.

“When the plant has been studied, or even before it is itself studied, its habits may be observed, I mean here its likes and dislikes. Many of us have plants in very varied positions in our gardens, it is interesting to see where they do best. Some plants are extremely fastidious, and will not grow in all positions, so we find out by observation, and perhaps by experiment, where they will, or will not, thrive.

We may also study them in various soils, for if we have but one kind of soil in our own garden, it is possible that a friend has a different kind of soil in his, and, by comparing his plants with ours, we can gain much interest. By these means we may also avoid many errors of our own and of other people.

"We can also, by watching the plants growing in various gardens and nurseries, decide what we like best for a further planting in the autumn or spring. It is a truly delightful occupation to go over a friend's lovely garden, and remark and take notes on certain plants with which one is specially taken. Such a list, with the names, heights, and colours, should be carefully drawn up, and kept till planting time, when it will be found a great assistance, and the result should be far more satisfactory than that obtained by choosing names out of lists, or visiting nurseries in the spring.

"If, as our saying says, experience teaches, I may be permitted to urge the interest of experiments during these summer months. No doubt, the results may not be of sufficient interest to be 'given to the world,' but still experimenting is very fascinating work. More especially do I now think of simple chemical fertilisers; their use with many plants may be studied, but of course be very moderate in their application.

"We may also experiment with colours and combinations of colours, and note which we like best. Many will have tried some new effect in their borders—perhaps, even in their summer bedding—this year, and much can be learnt if one has a good eye for colour effect. I need hardly add that it is no waste of time to record the results in the garden diary. So I urge, as I close this article, that the summer is a glorious time for study. We all wish to improve our knowledge on subjects of which we are fond, and we have before us now a time and opportunities in which to do it. Close observation and study of plant life will amply repay the trouble—if it is trouble—and the amateur will find new joys in gardening, and should gain more success."

"AUTUMN IN THE GARDEN.

"By the time this can appear, autumn, with all its beauty and glorious colouring, will be upon us. At that time the gardener should see, as far as possible, that order reigns in the garden, for if his care be slackened at this, of all times, he is likely to have chaos when there might be beauty for at least another six weeks.

"Of course, much depends on the weather. If the autumn is mild, then Chrysanthemums, Dahlias, Sunflowers, and many other flowers may continue to bloom right through September, October, and even into early November. Also some annuals often continue till late autumn, especially those sown after the general lot; but some do not pick up again, so a little discrimination is needed.

"Firstly, then, tall plants like Chrysanthemums must be well tied up to the stakes provided early in the summer. The laterals of outdoor Chrysanthemums which we always retain to gain a prolonged display of bloom, must be tied in firmly, or they will be soon broken off in windy localities, but it goes without saying that unless the stakes are firm and sufficient in strength and bulk, it is of little use tying up the plants. Many do not think of what their Chrysanthemums in the borders may yet have to go through. The equinoctial winds well-nigh defy the gardener, but if he does this tying up religiously before they come, much less damage should ensue.

"The hoe, too, should be kept very busy among the plants, for at this season all weeds are going to seed. Do not leave them on the ground after hoeing, it is unsightly and slovenly. Many do not realise the great vitality of weeds or they would rake them off at once.

"One word about leaves. In large gardens, where there are many trees, leaves fall thick and fast in the autumn. Of course they look untidy, and are swept up and stored for leaf-mould. But it is unlikely that the amateur will have time to indulge in the extreme tidiness I so hate to see. After all, it is autumn, and, though the beds and

borders should be kept tidy, as should everything up to a point, we should not be so tidy as to try to defraud the season. Much time can be wasted on sweeping up leaves ; indeed, unless the lower branches of the trees are well shaken, it is of little use, for a fresh litter will soon be down. Still, of course, leaf sweeping is a necessary and useful operation. Every one of us has some quiet thought of Nature as he sees the leaf-strewn ground ; or as he sits on an autumn evening and listens to the wind as it blows about the fallen leaves, so do not let us waste all our autumn time in sweeping them up.

“ The dead flowers of perennials must be taken off as soon as formed at this season, and the same with annuals. Some annuals, however, are best pulled up when they have finished their first crop of flowers ; the likelihood of a second lot of flowers in the late autumn is remote, and bare ground looks better than untidy remains. But any annuals which appear likely to continue to bloom, should be allowed to remain.”

“ THE GARDEN IN WINTER.

“ The average amateur gardener finds the winter months very dull, and is inclined sometimes to get morose as he sees the leafless trees rising out of one of our winter fogs. Every time he sets foot on the turf or soil of his garden, he finds it sopping wet ; he sees all his perennials dormant, and many of the borders quite bare. No wonder he feels dull and somewhat unhappy, as he gazes out, or as he returns from his work in the afternoon, finding everything dark as night.

“ But I want to offer a word of encouragement to such amateurs. They should bear in mind that there is a certain amount of work to do if the weather is suitable ; if not, the outside work must go. As our amateur sits round his parlour fire on a December evening, and hears the wind howling round, and the rain or sleet beating against his windows, let him not dwell on its sadness. Rain is

necessary, though such a deluge may mean that he cannot get on to his garden for a week or so to dig it up.

"Let him make himself comfortable in an easy chair, with his wife in another, before the fire. Let him avoid saying: "Hark at the rain and wind. Is it not shocking?" Nor abuse the Clerk of the Weather for sending such days and nights. He may get restless at the thought of the work awaiting him out of doors, the alterations in his garden, or the trenching and manuring which should be done before Christmas. But he may make his mind easy that to attempt alterations in inclement weather is no good, and that the garden operations, few or many, will wait without much harm for a week or two. 'What can't be cured must be endured.'

"The thing to do is not to dwell on the weather, but to think about the garden as it has been last summer. Perhaps many of my readers will have kept a garden diary or notebook, and jotted down points about the plants they grew. There is no better time than the winter months to go through this notebook, to summarise at the end what plants did well, what combinations of plants looked well together, and what did not. In this way the gardener will learn what to do and what to avoid. And the winter is the time for planning next year's garden. There may be other ways of employing the dull winter months, but I think the planning of future gardening the best. Look on the bright side of these dull winter months, for they will soon pass."

CHAPTER XXXI.

PICTURESQUE VEGETABLE GARDENING.

THE common idea that vegetable gardening is all that is ugly is far from true, and at the present time it is important to persuade as many folks as possible that even this form of gardening, although not so romantic as flower gardening, is not without a certain beauty of its own. This beauty is of a different kind from that we look for in flower gardening; there we look for direct colour effects; but in the vegetable border, though colour is possible, we must look more for the beauty of form, which is by no means absent.

At the time of writing there has been an appeal to everyone to grow food. We are not asked to give up all our flower borders, we are not asked to give up our lawn or our wild-garden, but merely to do our duty in producing more food for the nation than before. In some cases it may be necessary to give up flower borders for vegetable growing, and there will be few of us who may not have to sacrifice at least one border to the culture of vegetables for the time being.

Some alarmists have recently been preaching the doctrine that no flowers at all should be grown in borders this year. They do not object to a window-box or two, full of flowers, but they say that every bit of land outside should be laid down with vegetables. Food first, they say; flowers second.

If there was a dearth of land in England I should be the first to say that every flower garden should be turned into an allotment or a kitchen garden; but as there is

no dearth of land such a course seems to me unnecessary. In most districts there is much land lying in partial or complete waste; on this we can grow our potatoes and greens; in our flower garden we may sacrifice to some extent a large border, or even three or four, and grow those crops which possess some beauty of form if not of colour.

There is another reason why we should not entirely sacrifice our flower garden to vegetables. In these sad times flowers can cheer us up better than any earthly friend can, and a walk up and down the borders, or half an hour's work amongst them keeps us in health in both mind and body. Flowers cheer the home and the hospital, we cannot really afford to do without them. So I would say, "Don't sacrifice your flower garden entirely. Take an allotment under the new scheme organised by the Board of Agriculture for your potatoes and greens; and in your flower garden leave at least one or two flower borders untouched. On the others you can grow food, and plenty of it."

Flower Borders and Vegetables:—If you devote flower borders to food plants, two problems arise: Which borders to devote to the purpose, and what to grow. Before coming to a decision give the subject careful consideration. It would be a pity to break up that "lovely South border," so let us see whether we can avoid doing so. Perhaps there is a South-West border, or another South border which did not do so well last year. Why not turn these into vegetable borders? Perhaps there are some beds on the lawn which it is always a difficulty to fill with suitable plants. Why not use these borders for growing saladings? Or again, we may not want to spend money on half-hardy annuals for new summer bedding; why not use the borders reserved for summer bedding for the culture of vegetables? And, lastly, that North or North-West border in which few flowers thrive may be used for vegetables.

It may be that you have a long narrow border which runs

alongside of the lawn. This, too, is little use for flowers, for there is no room for a good colour display. Then widen it by taking in a few feet from the lawn and using it for vegetables. If your garden is a small one, and the supply of vegetables is of importance to you, do not hesitate to give up your South border to them. They should do a great deal better in the rich soil of the South border, and it will be far more worth while growing them there than in the small lawn beds. Naturally, matters of this kind depend on individual circumstances, it is for each of us to decide how much he can do to help the nation in food-growing, consistent with his being able to keep himself, his family, and the poor chaps in the hospitals in a cheerful state of mind. For my own part, I am not considering it necessary to give up all the flowers I usually grow. I have taken a plot under the scheme of the Board of Agriculture for potatoes, and am giving up a big border in my garden for other vegetables. My Sweet Pea trench this year is growing Broad Beans, which I consider both useful and beautiful.

This brings us to the second problem, if food plants are to be grown in flower borders, namely : Which are the most suitable crops to grow ? This is a problem on which there is room for many opinions. But everyone will agree that picturesque vegetable gardening is not possible if potatoes, cabbages, and like crops are the only vegetables grown. They may, and often do look extremely well in their straight and flourishing rows in the height of summer. But there is nothing picturesque about them, the potato and cabbage do not possess much beauty in their form or foliage.

On the other hand, some food plants do possess a distinct measure of beauty, and there is no reason why they should not be grown both for their food value and also to please the eye. The first example which occurs to me is that furnished by the Beetroot. In country mansions it is used freely for summer bedding, and no wonder, for the foliage of well-grown specimens is quite a sight. I have

already referred to Broad Beans. A row of these, either when in flower or in full pod-bearing, is not unpleasing ; indeed who will deny the loveliness of a row of Scarlet Runner Beans when in full flower ? Of such crops as Dwarf Beans, Celery, and Chinese Artichokes, we must admit that it is hard to see the beauty of form, so that they are best kept in the vegetable garden proper. But the foliage of such crops as Parsley, Endive, Carrots, etc., makes them more than worthy of a place in the picturesque vegetable garden, and they are as useful as they are beautiful. Parsnips are not so suitable ; their foliage in a young state easily gets unsightly. On the other hand, a good row or two of Leeks, Salsafy, or Onions does not easily become unsightly. Again, White Stone, or Golden Ball, Orange Jelly and other similar Turnips, though they may not possess actual beauty, are quite indispensable for the picturesque vegetable garden, and that novel plant, the Couve Tronchuda, should most certainly be included. Where Spinach can be grown without it immediately running to seed, this crop also should be included. Also the white-topped, or purple-topped Kohl-rabi, a crop much grown in foreign countries, and one which also thrives extremely well in England. It is a crop of great food value and not in the least unsightly.

I have already mentioned Broad and Runner Beans, so it is time I referred to Garden Peas. Some of these are among the most beautiful of all vegetable crops, though of course this depends on the care they receive and to a large extent on the selection of varieties. The dwarf sorts are not as pretty as the tall ones, but they are a great deal more useful, and those who have only a limited space at their disposal should be content with these. The tall sorts, however, are beautiful alike in form and flower. Long rows of these in the early summer are well worth going to see when in bloom. The strong healthy haulm surmounted by the white flowers makes a pretty sight indeed.

Another vegetable (or is it a fruit ?) which possesses

considerable beauty is the Tomato. In my own district we cannot grow it out of doors, but in many warm districts this is done largely every year. It can be trained up a trellis or fence, as can also the Vegetable Marrow, another extremely valuable crop. Another plant to be grown out of doors in warm districts only is the Egg Plant. The Ice Plant and the ornamental Chilian Beet may also be included.

The Globe Artichoke and the Jerusalem Artichoke are useful plants for hedge purposes. Sometimes the last-named sort will flower in England, but it is not often. Both are splendid food vegetables, and far from being unsightly.

We now come to saladings, which include Lettuces, Radishes, and Corn Salad. These are all extremely useful, and should most certainly be given a place in the picturesque vegetable garden.

There are some people who would include the Red Pickling Cabbage in the picturesque vegetable garden, for they say it possesses the novel appearance and beauty of form of some of the crops I have mentioned. It is one which might go in or not as you like. A good variety is Early Erfurt Blood Red.

There are several other crops which might be included, but I will only mention that known as Spinach Beet or Seakale Beet. Although at times this is rather a coarse growing plant, its fine rich-green leaves, and its creamy white leaf-midribs, make it well worthy of a place in the garden. It is easy to grow, and valuable for food. The gathering period lasts from July to the following June, the green portion of the leaves being used in the manner of Spinach and the white midribs as Seakale or Celery.

Cultural instructions for growing all the above can be found in any good book on vegetable gardening, so I do not propose to deal with them here. But what is equally important is how to arrange them, and I hope the following notes will be useful.

Take, for a first example, a row of tall Peas. It was

said in the earlier chapters of this book that straight lines should be avoided in the garden in favour of curves. But if we sow our tall Garden Peas in curved rows we shall be more than disappointed with the crop. In curved rows one side of the row gets very little sunshine and thus very few pods can swell. So, although we may dislike straight lines, we must have them in this case, and the same may be said of rows of Scarlet Runner Beans and Broad Beans. Where, however, Dwarf Peas are used, the rows need not be straight, for owing to the dwarfness of their growth the sun can get to both sides of them.

Rows of Tall Peas, Scarlet Runner Beans, and Broad Beans should always run directly North and South if possible. This is not necessary in the case of dwarfer subjects: their rows may run in the direction most pleasing to the gardener, or most adaptable to the circumstances. In a South border, for instance, the usual advice given would be to have short rows running North and South, but it looks a great deal better in using dwarf crops to have longer rows roughly in the direction of East and West.

So the general idea is to sow or plant your dwarfer vegetable crops in any direction which pleases you best, and to plant your tall crops in straight rows running North and South.

Before passing on to another scheme it is well for me to say a few words about general arrangement. I have suggested the inclusion of Carrots, Beet, Spinach, and Spinach Beet, Kohl-rabi, Turnips, Salsafy, Leeks, Onions, Parsley, etc. A good idea is to reserve a portion of the bed entirely for such crops as Leeks, Salsafy, and Onions. The Leeks are best put in the back row, then should come the Salsafy, and then the Onions, edged with a row of Parsley. Another portion may be reserved for Spinach, Spinach Beet, and Beet, the Chilian, black-leaved and crimson sorts being included. Spinach Beet being a tall growing subject, should be given the back row, then may come a row of Crimson Beet, then a row of ordinary Spinach (which will want renewing several times during

the season), then a row of Black-leaved Beet, another row of Spinach, and finally for the front, a row of Chilian Beet. Carrots, Turnips, Kohl-rabi and Parsley would go together quite well, in this case the Kohl-rabis should be placed in the back row; then may come a row of main-crop Carrots, then a row of Golden Ball Turnips, after which may come, in the order given, another row of Carrots of a stump-rooted variety, a row of Snowball Turnips (which will want renewing), another row of stump-rooted Carrots, and a row of Parsley to form the edging.

Tomatoes, Bush-Marrows, Globe and Jerusalem Artichokes may be put at the back of any of the above, they form useful hedging plants.

The other scheme may well be called the Group scheme, and I urge my readers to try it. We have no rows in it. Instead, each vegetable is grown in groups, and by judicious blending quite a fine effect can be produced.

We can begin with a crop such as Beetroot. Now the gardener is told in books to sow this 1-2 ins. deep in drills. Instead of this we work our garden soil up to a fine surface, and taking a stick mark out a small irregular patch in much the same way as for hardy annuals. This patch should not have any pretence to geometrical symmetry, for geometry is unsuitable for the garden. So this patch, while being fairly simple in its outline, should not have any semblance to geometrical form. When this patch has been marked out, the seed can be dibbled in, 2, 3, 4, or even 5 ins. apart each way. But as Beet does not germinate well, it is a good plan in this case to sow 2 ins. apart, and thin later if need be.

Along with this patch may be marked out others; in the neighbourhood of Beetroot, place as already mentioned Spinach Beet, Chilian Beet, and ordinary Spinach, Carrots, Salsafy, Turnips, Kohl-rabi, Onions, Lettuces, Radishes, and all the rest can also be sown in the Group scheme, placing as before, Turnips near Kohl-rabi, Sand Salsafy, Onions, Leeks, and Carrots in adjacent patches. Such crops as Lettuces and Endive can be used as an edging to this

border, and they may be given patches at the front. Such a border looks well if (the district being warm enough) a Tomato plant is planted every 3 or 4 yds. It can be backed by Jerusalem or Globe Artichokes.

It is well to point out that weeding and hoeing are rather difficult to carry out in this Group scheme of planting. It is not recommended that the border should exceed 7-8 ft. in width. In order to facilitate work leave a 9 in. alley across the border, at about every 6 ft.; from this narrow alley you can reach over and remove all the worst weeds by hand. Most vegetables are greatly benefited by generous waterings in the evening in the summer-time, and may be fed every week with one of the liquid foods mentioned in the chapter on Summer Feeding, taking care to keep it off the foliage.

CHAPTER XXXII.

A VEGETABLE GARDEN CALENDAR.

THE question of when to sow and plant is as important as what to sow and plant. In this Calendar of Operations I am summarising what seems to me to be the best times for sowing and planting. Naturally, the notes are very brief, but they will, I hope, be helpful.

JANUARY.

Get all digging and trenching done in the garden.
No crops can be sown or planted.

FEBRUARY.

Any digging not yet completed must be finished without delay.

Sow Broad Beans out of doors. Broad Windsor and Johnson's Wonderful are two good sorts.

Sow Leeks in shallow boxes, and place these in the greenhouse. Onions may also be sown.

Sow early Peas in turves placed in boxes in the greenhouse.

Sow early Lettuces in the greenhouse.

MARCH.

Sow Broad Beans out of doors.

Sow Peas out of doors. Of Dwarf Peas good sorts to grow are American Wonder, Earliest of All, and Little

Marvel. Of tall Peas, try Duke of Albany, Telephone, and Telegraph.

Sow Carrots, Salsafy, Turnips, Onions, Leeks, etc., out of doors. Try Carrot (Selected Altrincham); Salsafy (Giant Mammoth); Turnip (Golden Ball, Orange Jelly, and Snowball, six weeks); Onion (Ailsa Craig); Leek (The Lyon).

Sow Spinach Beet in boxes in a frame.

Prick off Leeks and Onions into boxes of light but rich soil, and towards the end of the month harden them off by transferring the lot to a cold frame.

Plant early Potatoes in a warm border.

Sow Parsnips.

Sow more Peas and Broad Beans at the end of the month.

Sow Kohl-rabi out of doors, or in a box in a frame. Sow also Couve Tronchuda, Celeriac, Lettuce, etc., in boxes indoors.

Towards the end of the month sow Lettuces, Endive, Spinach, etc., out of doors.

Plant Jerusalem Artichokes out of doors not later than the second week of the month.

APRIL.

Plant second-early Potatoes. Earth up any which have appeared above the ground.

Sow more Carrots, Salsafy, Turnips, Onions, etc., out of doors, and thin those sown last month, if possible on a wet day.

Sow more Broad Beans, and let this be the last sowing this spring. Get them in not later than the third week in the month.

Sow Main-crop Peas. Sorts ranging from 3 ft. to 4 ft. include The Gladstone, Royal Salute, Matchless Marrowfat, Senator, and many others equally good. Very tall sorts include Quite Content, Ne Plus Ultra, Dobbie's Selected Alderman, Rearguard, Goldfinder, etc., etc.

Sow Lettuces, Endive, and Cardoons either in a frame

or out of doors. Try Malta or Drumhead Lettuce, Digswell's Prize Endive, and Cardoon Solid Tours.

Thin root-crops as soon as they need it.

Keep the hoe going constantly between all outdoor vegetables.

Plant out Leeks in well-manured sites, and give them plenty of water.

Sow more Spinach out of doors to maintain a supply.

Sow Spinach Beet out of doors, and plant out that sown last month in a frame.

Plant out Onions in well-manured ground.

Earth up early Potatoes. Plant out Peas sown in turves.

Prick out Kohl-rabi, Couve Tronchuda, Celeriac, etc., sown indoors last month.

Sow Cabbage seed in a prepared bed, for use in the autumn and winter.

Sow Radishes out of doors, also Mustard and Cress, sowing the Cress three days before the Mustard and protecting from the birds by cotton.

MAY.

Get all Main-crop Potatoes planted not later than the tenth of the month.

Sow Beetroot out of doors in land free from lumps of manure.

Thin out all root-crops as soon as they need it, choosing a wet day if possible, and dust soot over the rows afterwards.

Make a final sowing of spring Turnips in a lightly shaded border.

Plant out Globe Artichokes in rich soil.

Earth up Jerusalem Artichokes.

Earth up Potatoes.

Prick off Cabbages sown last month.

Plant out Kohl-rabi and Couve Tronchuda if the plants are large enough.

Plant out Cardoons in rich soil.

Plant out Lettuces and Endive in slightly shaded borders to prevent them running to seed.

Keep the hoe going where possible between the vegetables.

JUNE.

Plant out Chilian Beet sown indoors in May.

Plant first-early Potatoes to give you a crop in September. They can be grown on land from which early potatoes are taken off in June.

Sow early Peas to give you an autumn crop. They can follow early Potatoes.

Plant out all kinds of Cabbage. The plants are best bought from a good market-garden in late June and planted at once, in cases where there is little space to grow from seed.

Gather Peas and Beans regularly.

Plant out Runner Beans if possible not later than June 7th. They can still be sown, though this should really have been done in May. They require a lot of water.

Sow more Lettuces and Endive to maintain a supply.

Plant out more Kohl-rabi and Cardoons, also Celeriac and Celery in your vegetable garden proper if you have one. This last crop requires trenches.

Plant out Dwarf Beans and Chinese Cabbage also.

Plant Vegetable Marrows and Tomatoes out of doors. Plants of these can be bought, or they can be raised from seed sown in heat in April and May.

Mulch Peas and Beans by placing a layer of short manure or grass mowings on each side of the rows, and see that they do not suffer for want of water.

By the end of the month the tops should be pinched out of Broad Bean plants, and burnt, to prevent attacks of black-fly.

Hand-weed vegetable borders arranged on the Group system, and apply fertilisers in wet weather.

JULY.

Lift more early Potatoes, and plant the ground at once with plants of the Cabbage tribe—Brussels Sprouts, Cauli-flowers, Coleworts, etc., etc.

Complete the gathering of early Peas, and clear the plants off the ground, planting it with late sown Spinach, Beet, Kohl-rabi, Lettuce, Endive, etc.

Gather Broad Beans, and remove the crop from the land as soon as it is finished.

Dig all vacant land over as soon as possible, and sow summer Turnips thereon, or sow Spinach Beet.

Lift Shallots as soon as ready.

Pull up early Carrots.

Start earthing up Leeks at the end of the month if they are grown in trenches.

Plant out more Lettuces, etc., as soon as the previous crop is used.

Sow more Radishes and Saladings.

Water Celery in the vegetable garden proper, with soot water, or liquid animal manure to encourage it to grow.

Feed Runner Beans with liquid manure.

Renew the mulches on Peas and Beans frequently when the weather is hot.

Gather dishes of mid-season Peas as soon as the earliest are over. If there is a glut of Peas some can be dried and stored for winter use.

Water Marrows and Tomatoes at least twice a week, and spray their foliage every evening not earlier than six o'clock with clear water.

Continue the hand-weeding of Group system vegetable borders, and burn any weeds which are in flower at once, in order to prevent seed ripening.

AUGUST.

While you are on your holiday get a friend to come in and gather your crops of Peas and dwarf Runner and

Broad Beans. Nothing so ruins the plants as being allowed to ripen the pods till the seed falls out.

From the point of view of vegetable gardening it is well to go for your holiday as early in August as possible, for the last fortnight of the month is apt to be busy.

Gather Cauliflowers as soon as they become ready, pulling up and destroying the stumps which are of no further use.

Spinach Beet will now be in full gathering, and care should be taken not to remove too many leaves from each plant.

At the end of the month pull up the last of the remaining Broad Bean plants.

Clear mid-season Peas off the ground as soon as they cease bearing well. There is still time to use the land they have occupied, and it is best utilised for the planting of further crops of Greens and late-sown Spinach Beet.

Lettuces may still be sown and planted. They require plenty of water these hot August days, otherwise they will become very tough and coarse.

Lift second-early Potatoes.

Earth up early Celery.

Sow winter Spinach.

Sow early six week Turnips.

SEPTEMBER.

Get to work among the Onions early in the month, pulling them up, and laying them out on a dry sunny piece of ground. When dry they may be tied into bundles and stored on pegs suspended from the roof of some dry frost-proof outhouse.

Continue to gather Peas, and clear off the plants as soon as they have ceased to bear.

Lift Main-crop Potatoes and store them in dark frost-proof sheds.

Lift Beetroot, being very careful not to damage the roots in any way.

Start lifting Salsafy for use in the home. The roots

of this must, like Beet, be handled very carefully or they will bleed.

Continue to gather Runner and Dwarf Beans. If there be any glut of Runner Beans, wash the pods well, slice them, and store them in jars, putting a layer of salt between each layer of sliced pods.

Gather the fruits of Tomato and Marrow plants before the end of the month. They can be stored in a light sunny shed. The fruits of the Marrow will keep till Christmas.

Lift Carrots.

Sow more Spinach Beet, in an open site, for gathering next spring.

Sow winter Spinach.

Sow winter Lettuce.

Earth up Celery and Leeks growing in trenches.

OCTOBER.

Any Potatoes still in the ground should be lifted without delay.

More Salsafy and Carrots can be lifted for immediate use.

Cauliflowers can be cut and used. Those remaining in the ground should have one or two of the outer leaves broken and laid over the "flower" portion in order to protect it from rain and snow.

Cabbages may be cut for use.

Start lifting Parsnips.

Start digging up Artichokes.

Gather the heads of Globe Artichokes without delay; if this has not been done before.

Clear the ground of Peas, Runner and Dwarf Beans. It is too late now to sow anything to give a crop of food this year, so that in districts where manure from the stables is scarce, the ground should be forked up at once, some soot and wood ashes being mixed in, and as large an area as possible sown with common Mustard. This is a quick growing crop, and one of value other than that of producing food for human beings. I mention it in December.

Cease gathering from Spinach Beet plants after the end of this month. Usually the plants will give another gathering the following January or February, and continue to bear from then to June.

Any late sown Turnips should now be ready for use. Clear them off the land before the slugs eat them.

Kohl-rabi should be pulled up, the roots stored in a shed, and the leaf-stems used for cooking. The roots can be stored till December and used then.

NOVEMBER.

Lift more Jerusalem Artichokes and store them in sand in a dark shed.

Lift more Salsafy, Parsnips, Carrots, etc. Store these similarly.

Go over the Potatoes stored recently and remove all tubers inclined to disease, burning them at once.

Broad Beans and first early Peas may be sown now in warm districts, and will give an early crop next year. They require a light rich soil.

Any land which has not been laid down with Mustard should now be trenched or deeply dug in the manner described in an earlier chapter. Bury the manure deeply and mix it well with the soil.

DECEMBER.

All land which was laid down with Mustard in October may now have the surface skimmed with a sharp spade. Then the ground can be deeply dug, putting a layer of the green material in each trench with a very little animal manure.

Get all the Jerusalem Artichokes lifted and stored by the end of the month.

Fork up all remaining Parsnips, Carrots, Salsafy, etc., and store them for future use.

Look over Potato stocks and remove diseased specimens as before.

Get all possible digging and trenching done this month, for the longer the land remains rough if it is heavy, the better it will be. But bear in mind what was said in Chapter XXIV on working light sandy land as early as this.

Burn all hard rubbish to get it out of the way, and store the ash in boxes in a dry place.

Turn over heaps of soft vegetable refuse for digging in in January, should the material not be sufficiently rotted to use now.

Lastly, go through the garden Diary and make plans for your garden next year.

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